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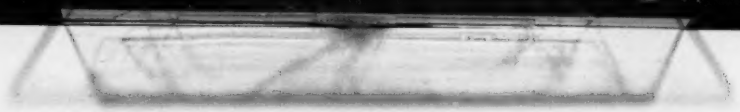

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Frederick A. Henny, D.D.S., Editor
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VOLUME 10 • OCTOBER 1952 • NUMBER 4 JOURNAL OF ORAL SURGERY

A method for deepening the mandibular and maxillary sulci to correct deficient edentulous ridges

■ *De Orr Cooley, D.D.S., M.S., Seattle, Wash.*

Up to the present time the correction of deficient mandibular and maxillary alveolar ridges by deepening of the associated sulci has been accomplished by two principal procedures. One is Waldron's modification of Esser's[1] split skin stent graft procedure, and the other is a procedure devised by Kazanjian.[2] It will be unnecessary to undertake a description of these standard procedures as they are well known, but reference will be made to them in evaluation of the operation presented in this paper.

My technic for deepening shallow sulci will be presented in two parts: presurgical and surgical stages. This will be followed by an evaluation of the merits of this procedure.

■ *Technic of Operation as Applied to the Mandible*

PRESURGICAL STAGE—The first part of the presurgical stage consists of obtaining a colloid impression of the ridge and sulci. The impression is poured in stone, and the resulting cast serves as a master model. This model is then duplicated in plaster. The second model, which serves as the working model, is poured in plaster because it can then be easily contoured as described later.

With dental films, roentgenograms are then taken of the mental foramen on either side to determine their proximity to the crest of the ridge.

With the aid of the models and the roentgenograms, the depth to which the sulci should be increased is determined. This depth is then registered on the plaster models by deepening the labial, buccal

Master's thesis, department of oral surgery, University of Michigan, June, 1951.

The accompanying illustrations of the various stages of the operation have been provided through the efforts and cooperation of William E. Justi.

1. Padgett, E. C. Surgical diseases of the mouth and jaws. Philadelphia, W. B. Saunders Co., 1938, p. 723.

2. Kazanjian, V. H. Surgical preparation of the mouth for artificial dentures. In Essentials of oral surgery, ed. 3, Blair, V. P.; Ivy, R. H., and Brown, J. B. St. Louis, C. V. Mosby Co., 1944, p. 278-295.

and lingual sulci of the model to the desired amount. The increase in depth represents the depth to which the sulci in the patient's mouth will be increased. In cutting the grooves along the sulci of the model, one should consider and allow for the differences in anatomic structures and form peculiar to the region involved and to the patient under consideration. After the sulci have been contoured to the desired form, baseplate wax is adapted to the denture-bearing area as is done in the construction of a baseplate. The model is then flasked and processed, and the resulting acrylic resin splint is trimmed and polished.

SURGICAL STAGE—The surgical procedure consists of four parts: The first involves the lingual frenum and underlying muscle fibers; the second part, the mental foramens; and the third part, the soft tissues of the ridge and the labial, buccal and lingual mucosa; the fourth part consists of immobilizing the newly formed sulci.

Lingual Frenotomy with Muscle Transplant Procedure—The first part of the operation may be termed lingual frenotomy with muscle transplant procedure. This procedure is indicated only when the alveolar attachment of the frenum is on or near the crest of the ridge or when the frenum is thick and particularly resistant. A transverse incision is made with scissors through the frenum at a point about 5 mm. below its attachment to the ventral surface of the tongue (Fig. 1, left). The incision is made at this point because here the anterior fibers of the genioglossus lie close to the mucosal surface. With the use of blunt dissection, the

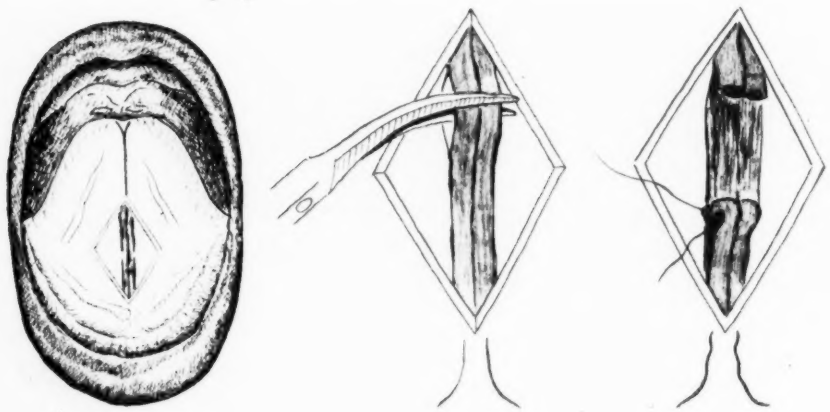


Fig. 1—Left: Diamond-shaped opening after transverse incision through lingual frenum. Anterior bundles of muscle fibers of genioglossus have been exposed. Center: Incision of two anterior bundles of muscle fibers near their insertion into the ventral part of the tongue. Right: Suturing incised bundles of muscle fibers to those immediately below them

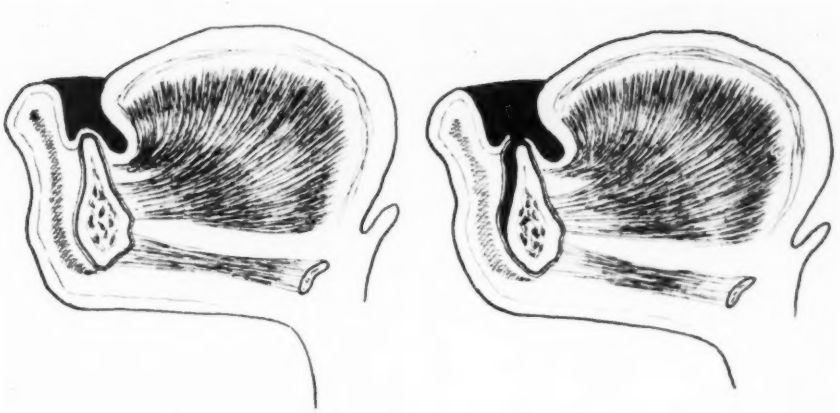


Fig. 2—Left: Shallow labial vestibule before operation. Right: The periosteum and attached soft tissues reflected from the labial surface of the mandible

right and left anterior bundles of muscle fibers of the genioglossus are located, isolated and traced up to their insertion into the ventral part of the tongue. At this point, they are severed from their attachments (Fig. 1, center). The cut surface of each muscle bundle is sutured to the upper surface of the muscle bundle immediately below it at a point about 10 mm. below its former insertion (Fig. 1, right). The mucous membrane at the margins of the incision are undermined and closed with no. 5-0 Dermalon sutures.

Procedure of Lowering the Mental Nerves and Vessels—The second part of the operation is directed to the mental foramens. This operation is necessary when the mental foramens are near the crest of the alveolar ridge as is often the case in small edentulous ridges. An incision is made through the mucoperiosteum along the crest of the ridge from about the second molar region on one side to the same point on the opposite side (Fig. 2). Vertical incisions are then made on either side, extending from the posterior extremities of the first incision down to the floor of the buccal sulci. The mucoperiosteum outlined by these incisions is reflected down to and then beyond the level of the mental foramens (Fig. 3A). The mental nerves and vessels are not severed. The muscular attachments above the level of the mental foramens which are reflected with the periosteum are those of the buccinator, mentalis and incisivus labii inferioris. The attachments of the quadratus labii inferioris and the triangularis, located respectively just anterior to and below the mental foramens, are likewise reflected with the periosteum. It may occasionally be necessary to detach the upper fibers of the platysma. The mental nerves and

vessels are retracted upward and away from the inferior margin of the mental foramens so that these margins are visible and accessible (Fig. 3B). With a surgical bur, a cut is made through the inferior margin of each foramen, and a groove the width of the foramen is extended downward to the level of the mandibular canal (Fig. 3C). This procedure allows the nerves and vessels to be lowered into this groove (Fig. 3D). Without this procedure, the depth of the sulci is limited by the height of the nerves and vessels.

Procedure for Securing Mucous Membrane to Line the Sulci—The third part of the operation is directed toward securing mucous membrane from the labial, buccal and occasionally lingual soft tissues for the purpose of lining the sulci. With the use of tissue hooks, the large mucoperiosteal flap referred to previously is held upward and away from the ridge by an assistant so that the inner periosteal surface of the flap can be seen by the operator standing behind the patient. Beginning on the inner surface of the left side of the flap, an incision is made through the periosteum about 3 mm. below the upper margin of the flap and is carried around the entire inner aspect of the flap to the right side. Mayo scissors are then inserted into the incision made through the periosteum, and the loose tissues just beneath the mucosa of the labial and buccal sulci, the inner surface of the lower lip and lower one-third of the cheek are undermined (Fig. 4). It is im-

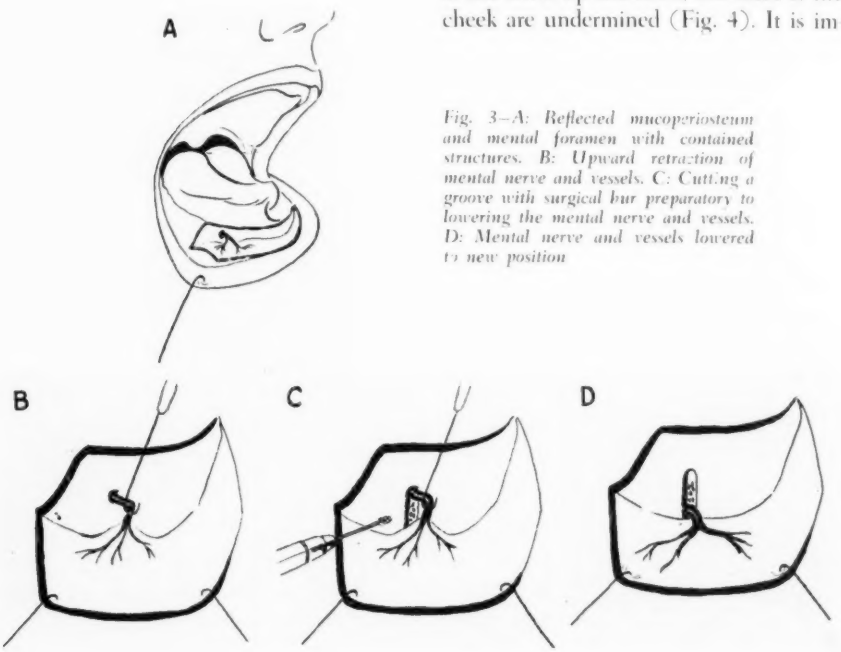


Fig. 3—A: Reflected mucoperiosteum and mental foramen with contained structures. B: Upward retraction of mental nerve and vessels. C: Cutting a groove with surgical bur preparatory to lowering the mental nerve and vessels. D: Mental nerve and vessels lowered to new position

portant to make certain that adequate mucosa has been undermined and that it has been completely detached from the underlying tissues. Three small holes are then drilled through the ridge just below its crest, one at the midline and one located on either side in the cuspid region. The labial and lingual mucoperiosteal flaps are then sutured snugly against their respective ridge surfaces by the use of horizontal mattress sutures which communicate through these holes from the margins of the labial and lingual flaps. Between the margins of the opposing flaps lies the crest of the exposed alveolar ridge bone. This space between these flap margins will heal by secondary intention (Fig. 5, left).

Anchoring the labial and lingual flaps as described previously, rather than approximating their margins, allows that portion of the flap otherwise covering the crest of the ridge to be utilized in deepening the sulci. This procedure also offers a better method of immobilizing the flaps during the period of healing.

Immobilization of the Sulci—The final stage of the operation consists of inserting the acrylic resin splint and immobilizing it with circumferential wires (Fig. 5). Before the intraoral labial and lingual ends of each circumferential wire are tightened over the splint, a gauze roll and small ash metal plate are placed under each wire loop along the inferior borders of the mandible so that the gauze roll lies against the soft tissues and the plate lies over the roll and beneath the wire loop. The purpose of the plate is to support the force exerted by the overlying wires when the splint is immobilized. The roll of gauze acts as a cushion between the ash metal plate and the soft tissues overlying the inferior border of the mandible.

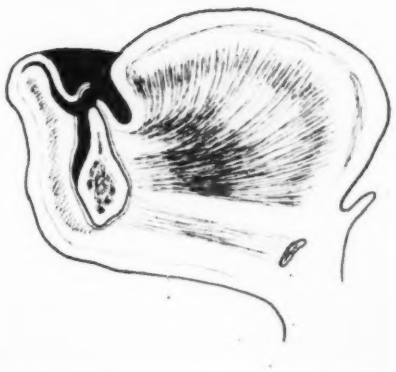


Fig. 4—Incised periosteum and undermined labial mucosa of sulcus and lip

The splint accomplishes three purposes:

1. It exerts a downward pressure and holds the labial, buccal and lingual mucoperiosteum in place against their respective ridge surfaces.

2. It holds the mental nerves and vessels down in the new grooves created for their reception until adequate healing has taken place.

3. It pulls the undermined lingual, buccal and labial mucosa downward into the newly created sulci and holds them firmly against the underlying soft tissues and against those surfaces of the ridge uncovered by periosteum (Fig. 5, left).

■ *Postoperative Care*

On the sixth postoperative day, the circumferential wires, acrylic resin splint and intraoral sutures are removed (Fig.

6). The patient is encouraged to continue to wear the splint, however, until a new denture is inserted. This will prevent shrinkage of the sulci during the healing phase before a permanent appliance can be inserted.

■ *Deepening of the Maxillary Sulci*

The technic for deepening the maxillary sulci, except where anatomic differences dictate a variance in the procedure, is the same as that used in the mandible. A vertical incision is made on either side on the buccal surface of the ridge just anterior to the lower border of the zygoma and is carried over the crest of the ridge and onto the palate, where it is terminated about 1.5 cm. from the crest of the ridge. At this point the incision is joined by a horizontal incision which is carried forward, parallel with the crest of the ridge, to the anterior midline of the palate, where it joins a similar incision carried from the opposite side. The horizontal incision and that part of the vertical incision made on the palate are not carried through the entire thickness of the palatal tissues but are extended to a depth of only 2 to 3 mm., the thickness of the flap to be reflected in order to prevent severance of the greater palatine and nasopalatine nerves and vessels. Beginning along the horizontal incised margins of the flap, a palatal flap about 2 to 3 mm. in thickness is cut free from the underlying adipose tissues. This flap is formed by sharp dissection until the mucoperiosteum of the ridge is reached, at which point the entire thickness of this tissue overlying the ridge

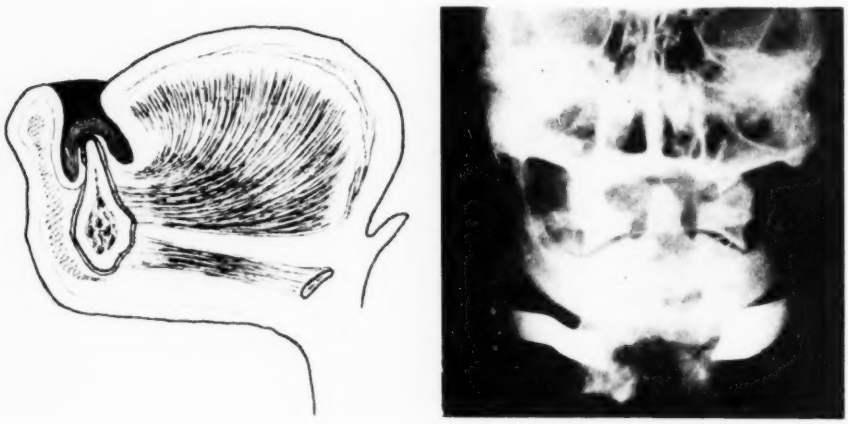


Fig. 5—Left: Splint in place. Note small area of bone at crest of the ridge uncovered by soft tissues. Note labial surface of ridge (illustrated by single line) where undermined mucosa has replaced periosteum, which in turn has been displaced downward along labial surface of mandible. The width of surface covered by mucosa plus width of exposed surface along crest of ridge represent extent to which sulcus has been deepened. Right: Roentgenograms of mandible with splint in place. Note ash metal plates along inferior border of mandible with circumferential wires encircling them

should be included in the flap. Continuing upward on the labial and buccal surfaces of the ridge and body of the maxilla, the periosteum and those muscles with their origin near the ridge are elevated from the underlying bony surface. Approaching the labial and buccal portion of the flap from its periosteal surface, an incision is made through the periosteum along the entire length of the flap; through this incision the labial and buccal mucosa is undermined as described with respect to the mandible.

Holes are drilled through the anterior maxillary ridge as described for the mandible for the reception of sutures to hold the margin of the flap firmly against the ridge. The posterior palatal angle of the flap is sutured on either side to the incised margin of tissues overlying the crest of the tuberosity.

The use of an acrylic resin splint to support the newly formed vestibule is not as advisable as in the mandible because of the difficulty of immobilizing it to the maxilla. The use of a rubber tube placed along the floor of sulcus as suggested by Kazanjian[2] is usually preferable to an acrylic resin splint. It is wise, however, to use the patient's old dentures built up at the periphery with compound to support the tissues during the period between the removal of the rubber tube splint and the insertion of the final prosthesis.

■ *Evaluation of the Operative Procedure*

I feel that the operation presented for the correction of deficient edentulous ridges is a relatively simple procedure and offers some advantages over the presently accepted procedures. There are four features of the procedure presented that are instrumental in improving the means of correcting this disability:

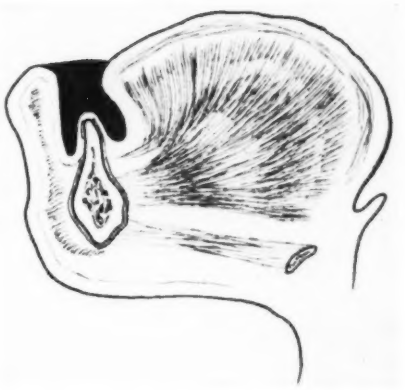


Fig. 6—Deepened sulcus following removal of splint. Exposed crest of ridge referred to in Figure 5 is now covered with soft tissue

1. The use of preoperative models for the purpose of planning in advance the desired depth and contour of the sulci.
2. The use of the lingual frenotomy with muscle transplant procedure to relieve the dislodging forces exerted by the lingual frenum and underlying muscle fibers.
3. The surgical preparation of the mucoperiosteum, mucosa and mental foramens preliminary to the deepening of the sulci.
4. The use of the acrylic resin splint and circumferential wires to maintain the position of the newly established sulci during the period of healing.

The advantage of using preoperative plaster models is that the depth and contour to which the sulcus is to be adjusted can be planned preoperatively and in ac-

cordance with the peculiarities of the case under consideration. For instance, the sulci will be deepened on the models at those sites where it will do the most good and cause the least interference to underlying structures.

The operation on the lingual frenum and underlying muscle decreases their dislodging forces and at the same time causes a relaxation of the anterior lingual peripheral denture border tissues near the gingival attachment of this frenum. This allows the anterior lingual sulcus to be deepened, even though slightly, with the result that the lingual peripheral seal of the denture is strengthened.

The third feature, the surgical preparation of the mucoperiosteum, mental foramens and mucosa, constitutes the most important part of the operation.

The advantages of separating the mucoperiosteum with the attached muscles from the bony surface rather than cutting the muscle fibers and other soft tissue free from the periosteum are several:

1. It allows an approach to the mental foramens, thereby facilitating the operative procedure on these structures (Fig. 3A). If the approach suggested by Kazanjian[2] is used, this procedure cannot be carried out and the sulcus cannot be deepened below the level of the foramens (Fig. 7, above, left).

2. By detaching the muscles with the periosteum and then sliding both down along the surface of the mandible or maxilla, there will be no appreciable loss of muscle function. If the muscle fibers are cut, however, they will retract and there will be a decrease in their functional capacity. It may be argued that little harm will result if their function is neutralized. This may be true in the case of the smaller muscles, particularly those with their origins on or near the alveolar ridge. If, however, the large muscles, such as the caninus, triangularis and particularly the mylohyoideus, are cut free from their origin, a more noticeable loss of function may result. It should be remembered that the sagging of facial tissues so common in the edentulous patient is due primarily to a loss in tone of these muscles. This decrease in muscle tone is caused by a shortening of the distance between the origin and insertion of the muscles brought about by the loss of the teeth and their supporting structures. One of the paramount aims of the prosthodontist is to restore the normal tone of the facial muscles by means of a restorative prosthetic replacement.[3] When the surgeon cuts these muscles, he neutralizes or decreases their ability to function and may consequently create an esthetic problem for the prosthodontist.

3. There is less formation of scar tissue when the muscles are moved with the periosteum rather than cut free from their periosteal attachments. The presence of scar tissue here will decrease the pliability of the border tissues and consequently resist a peripheral seal of the denture flange.

The advantages of cutting a deep notch through the inferior margin of each mental foramen for the downward displacement of the mental nerves and vessels is to allow the establishment of a greater depth to the overlying sulci and prevent

3. Swenson, M. G. Complete dentures, ed. 2. St. Louis, C. V. Mosby Co., 1947, p. 27, 28, 79 and 80.

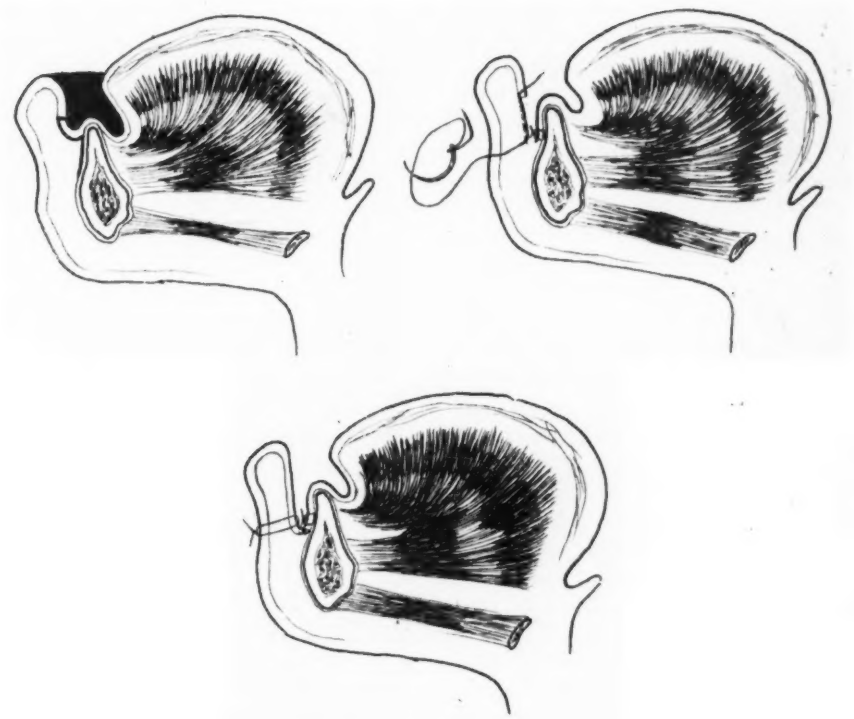


Fig. 7—Above, left: First step of Kazanjian's procedure, showing incision through mucosa of lip and undermining of mucosa to periosteum; also shows freeing of musculature and other soft tissues from labial periosteum. Above, right: Second step of Kazanjian's procedure, showing mucosa from lip folded down against and sutured to labial periosteum. Below: Completing of Kazanjian's procedure for deepening of the labial vestibule. Note that the incised margins of the mucosa meet along the bottom of the sulcus

painful impingement of the nerves by the overlying denture flange. Without this procedure, it is difficult to increase appreciably the depth of the sulci over these structures. Even in the stent graft method for deepening the sulci, these structures offer a problem unless they are sacrificed.

The method of approach presented for undermining the mucosa offers the following advantages:

1. It necessitates the exposure of the alveolar ridge, which may be freed of the knife edge spine so often accompanying edentulous ridges (Fig. 2, right). Frequently this sharp spine cannot be detected until the ridge is exposed, because it is cradled in soft tissue formed in response to irritation. If the mucosa is undermined as outlined by Kazanjian,[2] the mucoperiosteum is left intact and

either the sharp spine is left unnoticed or a second operation at a later date is required to remove it (Fig. 7, above, right). By removing this process at the time the sulci are deepened, not only does one save the patient the trouble of undergoing a second operation but, of equal importance, the excess mucoperiosteum formerly covering this spine can be utilized in deepening the sulci. Correction of the irregularities of the ridge, removal of retained root fragments and other similar procedures can, if necessary, be performed at this time.

2. Another advantage of this method is that the entire extent of the undermined mucosa from its base on the lip, cheek and floor of the mouth to its reflection from the mucoperiosteum remains intact (Fig. 4). In the method devised by Kazanjian,[2] it is necessary to suture the incised margins of the mucosa along or near the floor of the sulcus (Fig. 7, below). Here, as along any line of closure, there will be scar formation. The width of this scar is often increased as a result of the pull exerted on the suture line by such active structures as the lips. It is common knowledge[3] that the character of the border tissues is as important to the retention and stabilization of the denture as is the character of the alveolar ridge. By covering the deepened sulci with an intact mucosa and eliminating a line of closure along the floor of the sulci, one preserves the pliability of the border tissues and insures retention of the denture. The significance of the presence of scar tissue along the sulcus is, therefore, twofold: (*a*) It decreases the pliability and resiliency and consequently the adhesive qualities of these tissues. (*b*) By virtue of this decrease in adhesive qualities, these border tissues, which normally[3] move with the denture during function, resist this movement and consequently break the peripheral seal.

It is worthy to note at this point that one of the principal disadvantages of a skin graft to this area lies in the fact that the skin is less pliable and resilient than mucous membrane and, therefore, inferior in its adhesive qualities. A moderately deep sulcus lined with intact mucous membrane offers greater retention for a denture than a deeper sulcus lined with skin.

The advantages of using an acrylic resin splint as a means of supporting the newly formed sulci are as follows:

1. The labial, buccal and lingual sulci of the mandible may all be supported by the same appliance.

2. Two 30-gage circumferential wires, one on either side of the jaw, are all that is required to hold the splint in place. If a rubber tube[2] is used as a support to the sulci, then several sutures must be passed to the skin surface in order to stabilize these tubes.

3. It protects the exposed crest of the ridge from food and mouth fluids, thereby encouraging granulation over this area.

■ *Summary and Conclusion*

A method is presented for the correction of deficient edentulous ridges. It is by no means the solution to all the problems of denture retention and stability. There are many difficulties that, at present, cannot be corrected by surgical means. The influence of the anatomic size, positional relationship and intrinsic functional activity of the tongue on denture stability

as presented by Wright and co-workers[4] is an example of such a problem.

I feel, however, that in a relatively large percentage of patients with abnormally small ridges, this procedure offers a means by which this disability can be corrected.

By correcting this disability, the surgeon improves the denture-bearing foundation of the patient's mouth and consequently aids the prosthodontist in constructing a prosthesis that will be comfortable and useful to the patient.—*400 Union Bay Circle.*

4. Wright, C. R., and others. A study of the tongue and its relation to denture stability. J.A.D.A. 39:269 (Sept.) 1949.

Tetany in respiratory alkalosis

■ *James R. Hayward, D.D.S., M.S., Camp Carson, Colo.*

The untoward reactions witnessed in clinical practice demand quick evaluation and prompt resuscitation measures. Great variability is displayed in these reactions. A thorough knowledge of underlying physiologic phenomena is the only guide to effective counteraction.

Most guides to emergency resuscitation of patients with convulsions and untoward reactions cite the use of forced oxygen as the safest and most important measure. In the type of reaction to be reported, however, the administration of oxygen serves only to prolong and intensify the reaction.

In the past eight years I have witnessed three reactions that were rather unusual and clearly demonstrated a fundamental physiologic disturbance. The patients were essentially normal as far as could be determined by their history and examination and were undergoing extraction of teeth with standard local anesthesia. The reaction appeared at a different time in the procedure in each case and could not be correlated with responses to the anesthetic agents employed. All reactions were heralded by hyperexcitability and hyperpnea with generalized tremor and anxiety state. Respirations became uncontrolled and increased in rate and amplitude. The face became flushed. In the space of a few minutes, the typical tonic carpopedal spasm (Fig. 1) of tetany

Camp Carson Army Hospital, Camp Carson, Colo.

Fig. 1—Position of the hand in carpopedal spasm of tetany

with extremity convulsion and rigidity developed. A positive Chvostek's sign was demonstrated in one of the patients, and the classical picture of tetany was well established. The phase of hyperventilation suddenly ceased, followed by an alarming apnea. In the first case observed respiration ceased for several minutes, the patient was semicomatose, and the pulse faded off with a drop in blood pressure to shock level. This apnea phase was so distressing that forced oxygen was administered in an effort to make the patient breathe. This action succeeded only in prolonging physiologic imbalance, so that more cycles of hyperpnea, tetany and apnea followed, with general exhaustion of the patient. Henderson and many others, in their studies of respiration, have described this overventilation and "washing out" of carbon dioxide to produce alkalosis. In subsequent cases, rebreathing into a paper bag (Fig. 2) to accumulate carbon dioxide in the phase of hyperventilation, restored normal respiration and abolished the tetany phenomena promptly. If facilities are available, a high carbon dioxide gas mixture should be administered; this effects a quicker return to normal. Respiratory drug depressants are not necessary.

The acid-base equilibrium of the body is complex with many buffering factors to keep the alkali reserve within normal range. Relative alkalosis develops whenever blood alkali increases without a corresponding balance of carbonic acid (carbon dioxide in solution). This may occur with excessive ingestion of sodium bicarbonate, loss of gastric hydrochloric acid from repeated vomiting or excessive loss of carbon dioxide. It is this last that produced the respiratory alkalosis in the cases mentioned. When the pH rises sufficiently, a neuromuscular hyperexcitability is produced with increase in muscle tone and spontaneous contractions of tetany. The excitability of the respiratory center plays an important role in acid-base equi-

Fig. 2—Rebreathing into paper bag to accumulate carbon dioxide

librium. It is probable that a combination of emotional instability, anxiety state and sensitive respiratory center make a patient vulnerable to this reaction of uncompensated carbon dioxide deficit and resultant transient tetany.

Tetany reactions of neuromuscular hyperexcitability are common in cases of disturbed mineral metabolism. Calcium deficiency in the form of rickets and osteomalacia from insufficient intake and avitaminosis D, parathyroid hypofunction and intestinal disease also may be the background for tetany phenomena. Other factors also disturb the acid-base equilibrium. Renal function, metabolic processes and other significant modifications of blood chemistry are involved. Respiratory alkalosis is one of the least important of the disorders that lead to transient tetany. Respiratory alkalosis is seen in cases of air hunger associated with high altitude flying, fevers and hot baths, as well as in the anxiety states described above.

■ *Summary*

Careful study of the signs and symptoms of untoward reactions to oral surgical procedures is the only rational approach to resuscitation. Whether dealing with simple syncope, a local anesthesia reaction or a drug reaction, one must analyze the physiologic disorder and institute rational corrective measures promptly. Although the reaction of transient tetany in cases of respiratory alkalosis is only a compensatory physiologic phenomenon, it may cause unnecessary alarm and harmful emergency medication if it is not identified by its classical signs.

■ Clear Thinking

Yes, clear thinking is rare. To approach it, we need above all that indispensable quality of the scientific spirit—humility. Like the good scientists, we must be ready to sacrifice some of our personality and habits of thought as we face each new problem. For life's problems are always new, and defy all ready-made solutions.

That's what makes life so interesting.—*Rudolf Flesch, "The Art of Clear Thinking."*

Cleidocranial dysostosis

■ *Louis L. Leff, D.D.S., Camp Gordon, Ga.*

Cleidocranial dysostosis is comparatively rare, although several articles pertaining to it have been published during the past year. The literature offers articles dating back to 1871, when Scheuthauer described a patient with both clavicles and the skull affected.[1] Martin reported the first case of the clavicular defect in 1765.[1] Marie and Sainton, in 1897, appear to be the first to have described this syndrome *per se*.[2] According to the classical description, this syndrome consists in aplasia of one or both clavicles, exaggerated development of the transverse diameter of the cranium, delay in the ossification of the fontanels and hereditary transmission.[2] At present, the diagnosis of the disease is made even though the requirements of the classical description are not fully met.

Cleidocranial dysostosis may be considered as a congenital, familial and usually hereditary malformation of the skeleton,[3] with emphasis placed on the defect of the clavicles combined with those of the cranium. Heredity undoubtedly is an important factor. There is also a familial tendency. The syndrome may be inherited through either parent with about equal frequency.[1] Both sexes seem to be affected with equal frequency.[4] When heredity plays a part, the defect seems to be caused by a developmental disturbance that is genetic in origin, in which case it is transmitted as a dominant trait. In the nonhereditary cases, unknown environmental factors must be considered as causative.[5] Cleidocranial dysostosis occurs in all races.

The cause is unknown. Steidler expressed the belief that the condition belongs to the class of intrinsic systemic deformities arising during the first week of embryonic life.[6]

Formerly it was thought that cleidocranial dysostosis was purely a disturbance of the intramembranous bone formation, but recent studies have shown this concept to be wrong. Although the defective bones are usually membranous in origin, some bones of cartilaginous origin are also affected. The following list will show clearly that other than intramembranous bones are involved and that considerable variation can occur in this disease.[7]

■ *Clavicular Defects*

The following are unilateral or bilateral congenital defects. They lead to increased mobility of the shoulders.

1. Normal ends of the bone with a

Captain, Dental Corps, U. S. Army.

1. Fairbank, H. A. T. Cranio-cleido-dysostosis. J. Bone & Joint Surg. 31-B:608 (Nov.) 1949.

2. Scott, R. B., and Banks, L. O. Cleidocranial dysostosis syndrome: report of a case in a negro child exhibiting retarded growth. Am. J. Dis. Child. 81:394 (March) 1951.

3. Thoma, K. H. Oral Pathology, ed. 2. St. Louis, C. V. Mosby Co., 1944, p. 326-331.

4. Shands, A. R., Jr., and Raney, R. B. Handbook of Orthopaedic Surgery, ed. 2. St. Louis, C. V. Mosby Co., 1940, p. 48-49.

5. Mitchell-Nelson. Textbook of Pediatrics, ed. 4. Philadelphia, W. B. Saunders Co., 1945, p. 1180-1183.

6. Mercer, W. Orthopedic Surgery. Baltimore, Williams & Wilkins Co., 1940, p. 58-60.

7. Weinmann, J. P., and Sicher, H. Bone and Bones. St. Louis, C. V. Mosby Co., 1947, p. 152-153.

pseudoarthrotic gap filled with connective tissue between them.

2. A partial defect in one end, usually the acromial, its place being taken by fibrous tissue.

3. Presence of two separate fragments for each clavicle in some instances.

4. Absence of one or both whole clavicles.

5. Abnormalities of the muscles acting on the shoulder girth, varying with the type of clavicular deficiency.

■ *Cranial Defects*

Following are defects which sometimes are symmetrical.

1. Brachycephaly and dolichocephaly.

2. Malformations and retarded closure of the various sutures and fontanels of the skull.

3. Bossing of the frontal, parietal and occipital bones.

4. Development of numerous wormian bones.

5. Retrusion of the maxilla and relative protrusion of the mandible.

6. Relatively small face.

7. Underdeveloped nasal, lacrimal and zygomatic bones.

8. Unpneumatized mastoids in some cases; absent or disproportionately large

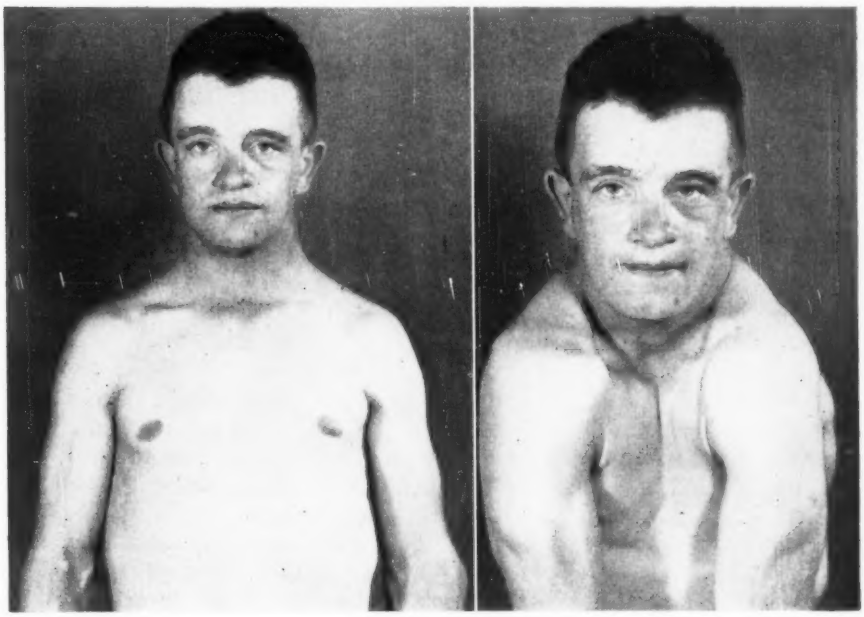


Fig. 1—Left: The width of the shoulders was less than normal; both clavicles were noticeable and shortened. The thoraco-abdominal region was barrel-shaped. Right: Pronounced increase in mobility of the shoulders

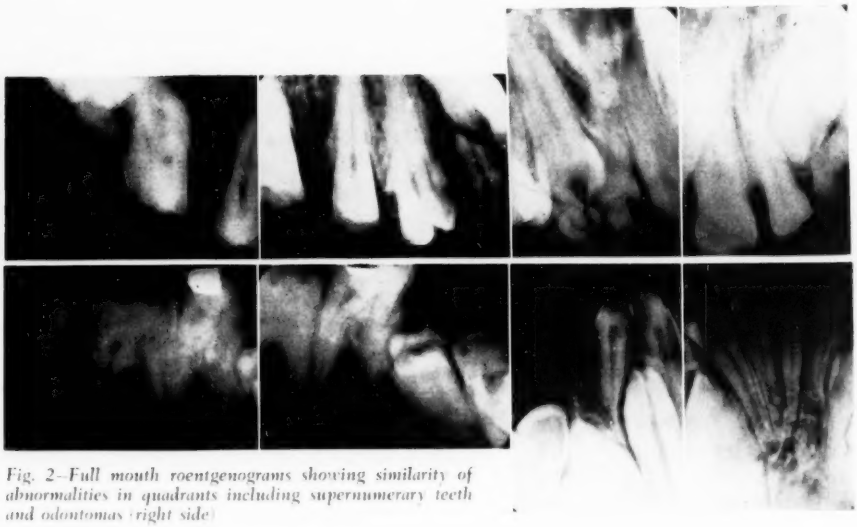


Fig. 2—Full mouth roentgenograms showing similarity of abnormalities in quadrants including supernumerary teeth and odontomas (right side).

frontal sinuses; underdeveloped paranasal sinuses; absent or diminutive maxillary sinuses.

9. Lack of ossification in most of the vault.

10. High palate or cleft palate with micrognathia of the maxilla.

■ *Dental Defects*

The following dental defects frequently are present.

1. Deciduous teeth in both jaws.

2. Unerupted permanent teeth in both jaws.

3. Displacement of the teeth.

4. Morphologic changes, such as short and slender roots of the permanent teeth and cone-shaped teeth.

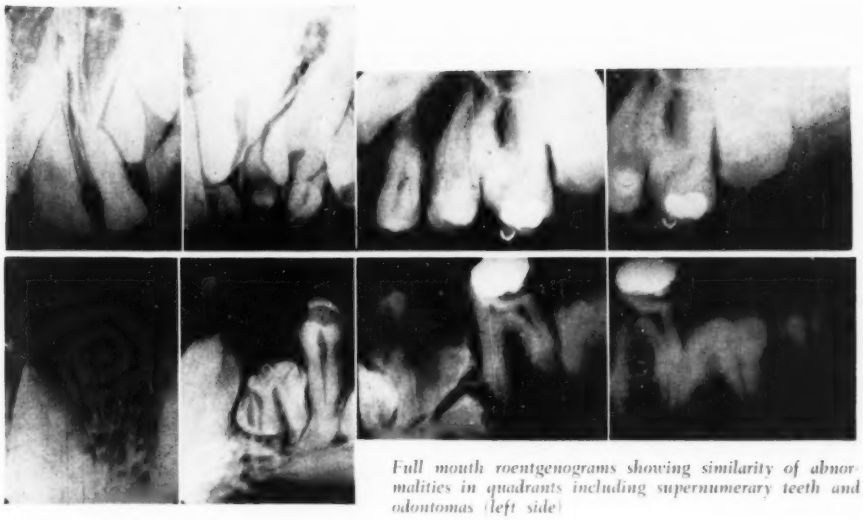
5. Supernumerary teeth.

In addition to the skull and clavicular changes, the whole skeleton is retarded. Some of the other associated defects that may also exist are variations in the small bones of the hands and feet with imperfect long bones and short phalanges; postural defects and spinal curvature, which are common with deformities of the thorax, spine and pelvis; spina bifida occulta; syringomyelia; prolapse of the virginal uterus and inguinal hernia.

In all the reported cases mentality appears normal.

■ *Report of a Case*

A man, aged 20, was observed while undergoing a routine dental examination. He appeared to be retarded in skeletal growth and was smaller in stature than normal. The enlarged head and bulging forehead, with frontal bosses and prominent parietal and occipital eminences, presented the typical picture of cleidocranial dysostosis. The width of the shoulders was less than normal, and there



Full mouth roentgenograms showing similarity of abnormalities in quadrants including supernumerary teeth and odontomas (left side)

was a pronounced increase in mobility. Both clavicles were noticeable and appeared shortened. The thorax was not prominent, although the abdomen was slightly enlarged, giving the thoracoabdominal region a barrel-shaped effect (Fig. 1). The patient related that no one in his family had a similar condition. His parents, a brother and sister were living.

■ *Oral Examination*

In the maxilla the following number of teeth were erupted, seven permanent, six deciduous, and one supernumerary. In the mandible there were seven permanent and two deciduous erupted teeth. All the soft tissues appeared to be normal in tone, texture and color.

Dental roentgenograms showed 23 teeth in the maxilla, and 19 teeth and two odontomas in the mandible (Fig. 2). They were divided as follows:

Unerupted	8	7					3	2	1						2	3								7	8
Erupted			6	5	4	C	B	A	S					1	B	C	4	D	5	6										
Erupted			6			4	C	2	1					1	2	C				6										
Unerupted	8	7			S	5	X	3							3	X	4	5			7	8								

S—Supernumerary
X—Odontoma

It should be noted that a similarity exists in these quadrants with the second and third molars unerupted, most of the permanent maxillary anterior teeth unerupted, and all the first molars and the mandibular central and lateral incisors erupted. Similar dental formulas have been previously reported in such cases.[4]

■ *Roentgenographic Skeletal Survey*

The skull was dolichocephalic, with a centrally located 2 by 5 cm. defect between the frontal bones (Fig. 3A). Pronounced delay in the ossification of the

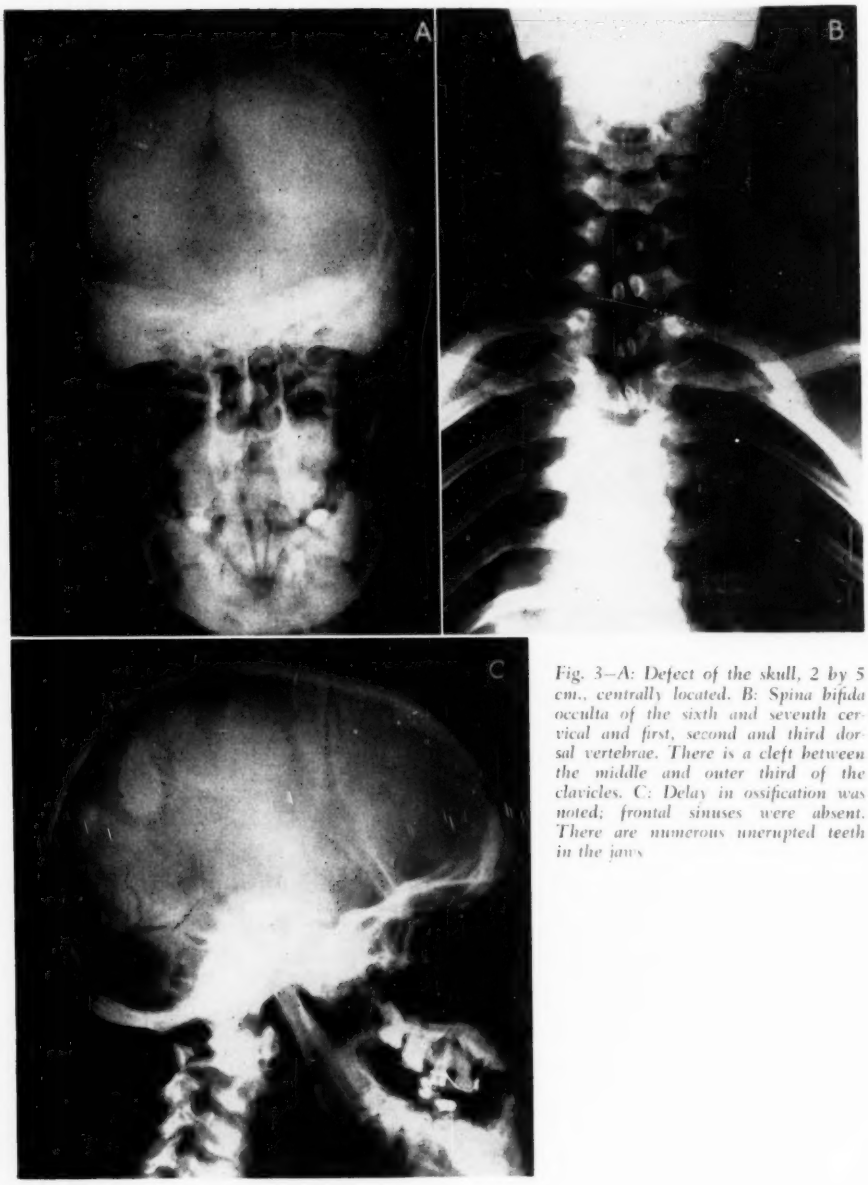


Fig. 3—A: Defect of the skull, 2 by 5 cm., centrally located. B: Spina bifida occulta of the sixth and seventh cervical and first, second and third dorsal vertebrae. There is a cleft between the middle and outer third of the clavicles. C: Delay in ossification was noted; frontal sinuses were absent. There are numerous unerupted teeth in the jaws

skull was noted (Fig. 3C). The frontal sinuses were absent; mastoids were subnormal in size (Fig. 3C).

A lateral view of the mandible and maxilla showed numerous unerupted teeth (Fig. 3C). The sixth and seventh cervical and first, second and third lumbar vertebrae showed spina bifida occulta (Fig. 3B). There was a definite cleft between the middle and outer third of both clavicles apparently representing ununited centers of ossification (Fig. 3B). Pelvic examination revealed congenital spina bifida occulta of the first sacral segment and slight separation of the symphysis pubis. An ununited ossification center was observed in the medial epicondyle of the left humerus and of the later epicondyle of the right humerus. The diagnosis was cleidocranial dysostosis.

■ *Treatment*

The maxillary left deciduous lateral incisor, cuspid and molar were removed. The left permanent lateral incisor and cuspid were exposed and a fracture arch was wired to the maxillary teeth with rubber traction applied from the cuspid to the arch with the hope of vertical movement. If this test proves successful within the next few months, exposure of some other unerupted teeth will be performed and similar treatment will be instituted. Should failure result, the unerupted teeth and the odontogenic growths will be removed.

■ *Comment*

More cases of cleidocranial dysostosis may be discovered in the future since so many persons are being examined routinely, both in the Armed Forces and in private practice. When retained deciduous teeth and numerous unerupted teeth are present, cleidocranial dysostosis should be suspected; one should then note the degree of mobility of the shoulders in order to corroborate the initial impression.

■ STUDY

There is no business, no avocation whatever, which will not permit a man who has the inclination to give a little time every day to study.—*Daniel Wyttenbach.*

Modern concepts in the prosthetic rehabilitation of cleft palate patients

■ *Cloyd S. Harkins, D.D.S., Osceola Mills, Pa.*

Oral prosthetics has made a significant contribution to the rehabilitation of patients with cleft palate. This may be attributed to (1) altered concepts of competent, progressive maxillofacial and oral surgeons, (2) recent research on facial and maxillary growth, (3) current trends in rehabilitation, and (4) technical advancements achieved in oral prosthodontics.

In general, the concepts of leading surgeons have been modified by the acceptance of three facts that were previously controversial. First: In modern surgical concepts a cleft palate deformity "does not constitute an emergency."[1] Surgeons no longer believe that the survival of an infant necessitates closure of the deformed areas within a few days or weeks after birth. They recognize that infants with cleft palate can subsist adequately by the use of special feeding methods that are not outstandingly different from those used for normal infants. They realize, too, that the psychological effect of this deformity on parents can be minimized by adequate guidance and does not require operation on the infant to appease or diminish the alarm of the parents. It is also acknowledged that the survival of an infant may be threatened rather than assured by early surgery and it may therefore be preferable to delay palatal surgery and perform facial and alveolar surgery in several stages after the infant has attained sufficient weight to withstand the trauma of operation.

Second: Palatal closures have resulted too frequently in postoperative nonfunctional restorations. Results of surgical treatment of cleft palate vary considerably. Types of failures may be classified as follows:

1. Low, heavily cicatrized vault with a foreshortened soft palate and some degree of dental distortion (Fig. 1, a).
2. Perforations along the suture line in the soft palate (Fig. 1, b).
3. Perforations along the suture line in the soft and hard palate (Fig. 1, c).
4. Mere bridges of united palatal tissue with considerable dental distortion (Fig. 1, d).
5. A satisfactory closure of one of the palates and an inadequate closure of the other (Fig. 1, e).
6. A lateral and anterior extension of the cleft created by the destruction or sloughing of tissues in repeated surgical attempts to obtain a closure (Fig. 1, f).
7. Palatal mutilation and destruction of tooth buds (Fig. 1, g).
8. Severe palatal and dental distortions (Fig. 1, h).

1. Ivy, R. H. Management of cleft lip and palate. Philadelphia Medicine, May 11, 1946.

The cause for these failures may be insufficient surgical skill or unpredictable postoperative accidents. It is conceded by surgeons that there are degrees of cleft for which palatal surgery will be more damaging than helpful and that palatal clefts must be selected with greater caution if surgical intervention is to have successful, functional results. Most surgeons feel that closure in three stages of a carefully selected palatal cleft should result in good function and, if it does not, further surgical attempts are usually contraindicated. Clinical evidence of postoperative failures will support these opinions.

Third: Many surgeons now agree that the greatest surgical contribution to the rehabilitation of patients with cleft palate is adequate initial and secondary reconstructive facial and alveolar surgery.

A summation of these altered concepts is that it is now realized that the use of the oral tissue to obtain a functional palatal closure in some cases may be unsatisfactory, impossible or even unnecessary. Research on facial and palatal growth as well as clinical evidence of surgical results has done much to influence these conclusions.

Recent research on facial and maxillary growth has confirmed the following observations:

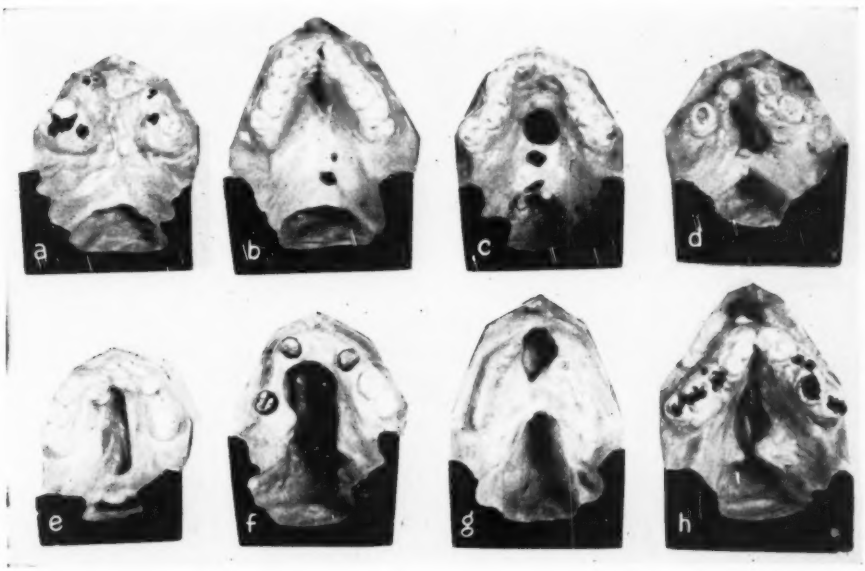


Fig. 1—Degrees of postoperative palatal failures: (a) cicatrized vault with foreshortened soft palate, (b) perforations in the soft palate, (c) perforations in the hard and soft palates, (d) bridge of united tissue, (e) adequate restoration of the soft palate, (f) extension of cleft, (g) dental destruction and palatal mutilation, (h) dental and palatal distortions

1. Five-sixths of the lateral growth of the hard palate is completed by five years of age.

2. Downward and forward growth of the palate, which extends the antero-posterior palatal dimension, is continuous until the age of 20.

3. Normal growth continues after birth unless growth centers are damaged or restricted by surgery or disease.

4. Surgically repaired palatal tissues grow at a slower rate.

5. Palatal surgery performed on children younger than five or six years of age restricts normal facial and maxillary growth.

These findings cannot be ignored by anyone sincerely interested in the satisfactory rehabilitation of infants, children and adults with cleft palate.

Modern rehabilitation concerns itself with the patient's needs, handicaps and problems. The central idea in rehabilitation is to aid the patient to minimize the deformity by improving facial and dental esthetics, mastication, deglutition and speech in order to secure personal, social and vocational adjustments. This is not the responsibility of one specialist nor can adequate rehabilitation be achieved by any one specialist. Rehabilitation, depending on the age and problems of the patient, may involve the pediatrician, general practitioner, otolaryngologist, oral and maxillofacial surgeons, the general practitioner of dentistry, orthodontist, prosthodontist, schoolteacher, psychologist, speech therapist, vocational counselor and parents. The contribution of the specialists can be coordinated in cleft palate clinics where the specialists examine a patient and discuss and propose an adequate, sequential rehabilitative program. Such clinics have been established in Pennsylvania, Illinois, Iowa, Wisconsin and other states. It is the goal of rehabilitation to diminish the handicaps of this deformity by preventing the occurrence of difficulties rather than continually to correct existing difficulties.

The acceptance of prosthetics as an initial method of rehabilitation has been furthered by the technical advancements achieved. In the past, prosthetics has been disregarded as an initial method on the basis that it was impossible to construct a speech aid for patients until adolescence or adulthood. This opinion was not substantiated by clinical evidence. It is now known to be possible to construct an adequate speech aid for a child as soon as the deciduous teeth have erupted at two and a half or three years of age (Fig. 2, left). The procedure for young children is different from that for older patients. It is possible, however, to take an impression and obtain tolerance of a speech aid by eliciting the cooperation and reducing the fears of the young patient through the establishment of a satisfactory relationship. Any prosthesis for a young patient is a temporary one since it is necessary to make frequent modifications as facial and palatal growth occurs. These modifications are expected ones and are achieved easily, rapidly and inexpensively. Constant observation will assure an adequate prosthesis during the period of facial and palatal growth. The original speech aid is constructed first with the necessary maxillary and palatal compensations to establish tolerance (Fig. 2, right (a)), and the pharyngeal section (Fig. 2, right (b)) is attached after this tolerance has been

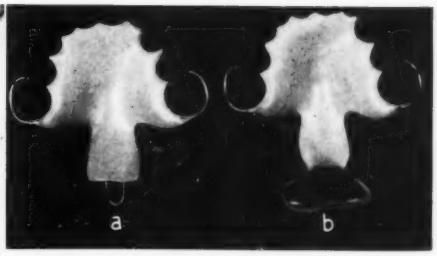


Fig. 2–Left: Child, aged two and a half, with speech aid in situ. Above: Temporary speech aid for young children, (a) without pharyngeal section, (b) with pharyngeal section

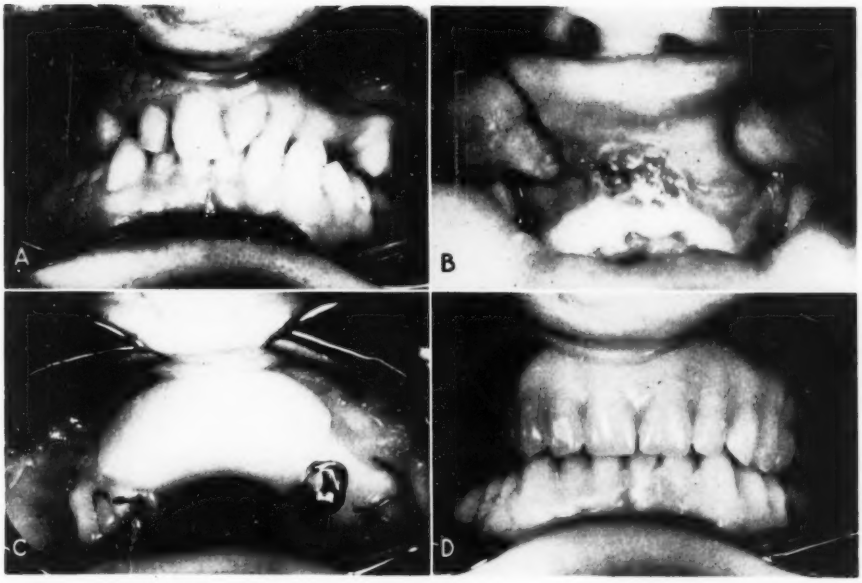


Fig. 3–Sublabial adhesions. A: Before relief; B: after incision; C: surgical splint; D: prosthetic functional occlusion

achieved. The child's acceptance of the prosthesis usually surpasses that of most adults. It is advisable to provide every young patient with a speech aid before the age of five so as (1) to permit the establishment of efficient performances of mastication, deglutition and speech, (2) to prevent the development of defective performances of these functions and (3) to allow the facial, dental and palatal growth to occur unimpeded. The research on growth centers and clinical evidence of postoperative failures substantiate this.

Another advancement in prosthetics has been achieved because of the need to overcome certain postoperative complications. The prosthesis must accomplish what repeated surgery has not. In some situations there may be palatal conditions necessitating the removal of postoperative obstacles in order to achieve a satisfactory speech aid. There are four general postoperative conditions that require correction before construction of a satisfactory prosthesis: (1) minor sublabial adhesions, (2) protruding premaxilla, (3) a nonunited premaxilla in a bilateral cleft, and (4) the existence of certain soft palate obstacles.

Minor sublabial adhesions (Fig. 3A) may be present which must be incised to free the labial and alveolar areas in order to establish prosthetic occlusion and maintain anterior balance of the speech aid during oral activities. The adhesions are incised (Fig. 3B) and an acrylic surgical splint, previously constructed by the prosthodontist, is inserted and retained in position by orthodontic bands on the maxillary teeth until the tissue has healed and freedom from adhesions is assured (Fig. 3C). The speech aid can then be constructed to establish functional occlusion (Fig. 3D) and to maintain proper anterior retention of the prosthesis.

A protruding premaxilla, usually with severe adhesions, may exist, which distorts the facial appearance, dental occlusion and dental arch and threatens proper balance and retention of the speech aid. In such a situation resection of the labial plate of the premaxilla and incision of adhesions are performed to establish an adequate alveolar contour (Fig. 4A). The resection operation necessitates elevating the mucoperiosteum sufficiently to expose the premaxilla completely. The complete premaxilla is resected with the exception of a part of the palatal plate. The elevated flaps are sutured to the mucoperiosteal flaps of the maxilla to create a soft tissue union and close the sublabial oronasal fistulas. The severe adhesions are incised and the bed is lined with a split skin graft taken from a hairless area. Dental compound is placed on the periphery of the labial flange to act as a stent to support the skin graft and prevent contracture. The stent is retained by orthodontic bands on the maxillary teeth and must be firmly maintained in position until the tissues heal (Fig. 4B). The speech aid can then be constructed to establish functional occlusion (Fig. 4C) and proper anteroposterior balance of the speech aid during oral activities (Fig. 4D).

A nonunited premaxilla in a bilateral cleft, known as a floating premaxilla (Fig. 5A), may be present. This will be displaced upward by the speech aid thus impeding breathing and causing discomfort as well as threatening the balance and retention of the speech aid. In this state of nonunion, the premaxillary process is

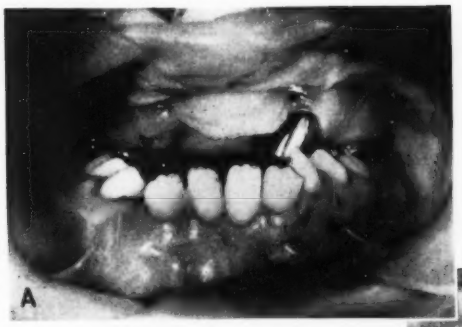
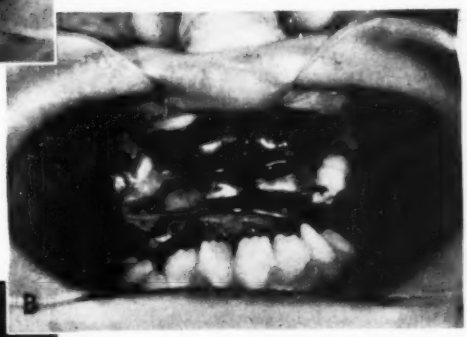
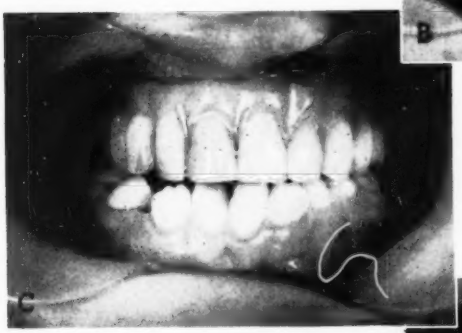


Fig. 4—Protruding premaxilla. A: After relief of adhesions and resection which reveals the premaxilla



B: Surgical stent in situ after resection



C: Prosthetic functional occlusion

D: Speech aid in situ

Fig. 5—A: Floating premaxilla depicting degrees of nonunion

B: Degree of palatal nonunion

C: After excision

D: Anterior section of speech aid in situ

functionally useless. Previous surgical attempts to reestablish union having been unsuccessful (Fig. 5B), continued surgery to obtain a union in this region is likely to result in greater mutilation. Excision of the complete floating premaxilla may therefore be necessary (Fig. 5C) to establish a functional occlusion and an adequate contour of the dental arch as well as a complete prosthetic palatal restoration (Fig. 5D). It is also possible to resect the labial plate of a floating premaxilla when certain degrees of nonunion exist, in order to preserve portions of the premaxilla.

The existence of certain postoperative soft palate obstacles necessitates the redivision of the inadequate soft palate to the posterior border of the hard palate or to the line of flexion in order to (1) maintain posterior balance, stability and retention of the speech aid during oral activities, (2) prevent the impaction of food on the superior surface of the palatal section of the speech aid during deglutition and (3) approach and contact Passavant's cushion in the pharyngeal cavity, which is the region of the greatest sphincteric action during oral activities. This contact is usually made on an approximate level of the tuberosity of the atlas bone.

The redivision of palatal tissue to permit the construction of a satisfactory prosthesis is a simple operation which may be performed with local or general anesthesia. The redivided soft palate, resembling an incomplete cleft palate that has not been repaired, should be about 1.5 cm. at the posterior border of the hard palate and wider in the soft palate area. A wedge of tissue is excised after the palatal tissue has been tensed by a silk traction suture or skin hook to facilitate the incision. After the redivision, the soft tissues on the two sides of the re-created cleft will fall apart and the raw surfaces may be covered with a few sutures to hasten healing. There will be some lateral retraction of tissue after redivision so that the re-created cleft will be wider than the excised wedge of tissue. The patient is usually hospitalized for two days and the tissues are sufficiently healed in two weeks to permit one to begin the construction of a prosthesis. The degree and shape of the tissue excised will depend on the type of palatal obstacles present which threaten the construction of a satisfactory speech aid. It is essential, however, to preserve the pillars. The extent of the redivision can be specifically defined on the palate and this will assist the surgeon and assure a satisfactory redivision. The degree of redivision is marked with a silver nitrate applicator or a caustic pencil composed of 40 per cent silver nitrate and 60 per cent potassium nitrate (Fig. 6).

Fig. 6—Extent of redivision defined with silver nitrate applicator or caustic pencil on the palate

Surgical re-creation of a cleft in the soft palate is necessary when palatal surgery has resulted in objectionable conditions.

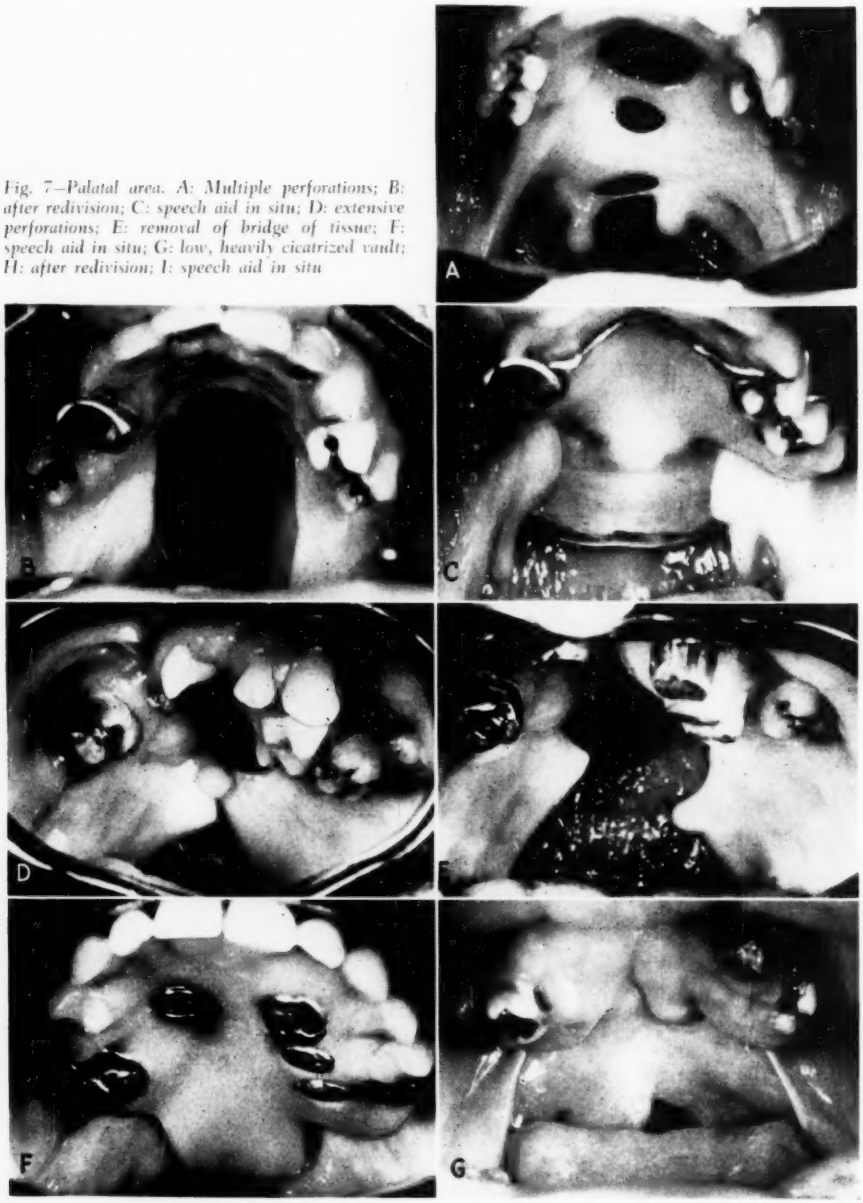


Fig. 7—Palatal area. A: Multiple perforations; B: after redivision; C: speech aid in situ; D: extensive perforations; E: removal of bridge of tissue; F: speech aid in situ; G: low, heavily cicatrized vault; H: after redivision; I: speech aid in situ

1. Multiple perforations may be present in the palate, usually along the suture line. In one such case (Fig. 7A) an adequate oronasal separation was not achieved after 11 operations and this fragmentary union of tissue impeded the success of a speech aid. The redivision re-created an incomplete cleft to an anterior perforation (Fig. 7B) and an adequate speech aid was then constructed (Fig. 7C).

2. Extensive cleft areas may exist with mere bridges or bands of united tissue (Fig. 7D). The redivision in one case resulted in a cleft to the alveolar ridge by excision of the bridge of tissue (Fig. 7E). The speech aid that was constructed provided adequate palatal restoration and functional occlusion (Fig. 7F).

3. There may be a low, heavily cicatrized palatal vault (Fig. 7G) which restricts the oral space and necessitates the placement of the prosthesis at too low a level to be retained *in situ* with comfort and efficiency. The redivision recreated a cleft to the posterior border of the hard palate after the excision of a wedge of tissue (Fig. 7H) and the pharyngeal section of the speech aid was placed at a functional level to subserve oral activities (Fig. 7I).

4. There may be limited mobility of the palatal muscles which would displace the speech aid (Fig. 8A). Although the degree of mobility is nonfunctional for speech purposes, a surgical redivision is necessary to assure an adequate prosthesis. It is important to redivide the soft palate sufficiently or the result will not assist the prosthetic reconstruction and will necessitate another redivision operation (Fig. 8B). A speech aid constructed after inadequate redivision (Fig. 8C) may restrict oral space and necessitate placement of the pharyngeal section of the speech aid at too low a level. A second redivision, performed after a trial period of speech therapy may then be necessary to obtain a good result (Fig. 8D). The original speech aid (Fig. 8E) must then be modified to accommodate the resultant palatal change after the second redivision operation. The altered prosthesis (Fig. 8F) will thus achieve increased oral space and proper pharyngeal placement.

Lateral views of a speech aid after first redivision (Fig. 9A) and second redivision (Fig. 9B) reveal the degree of

improvement achieved by adequate redivision. It is, of course, essential to achieve adequate redivision on the first attempt; one can assure this by defining the extent of redivision with an application of silver nitrate on the palate.

A redivision operation may be necessary for occult or submucous clefts in which the intact mucoperiosteum conceals the osteal or muscular clefts (Fig. 10A). In one case a redivision of the mucoperiosteum exposed the degree of cleft to the

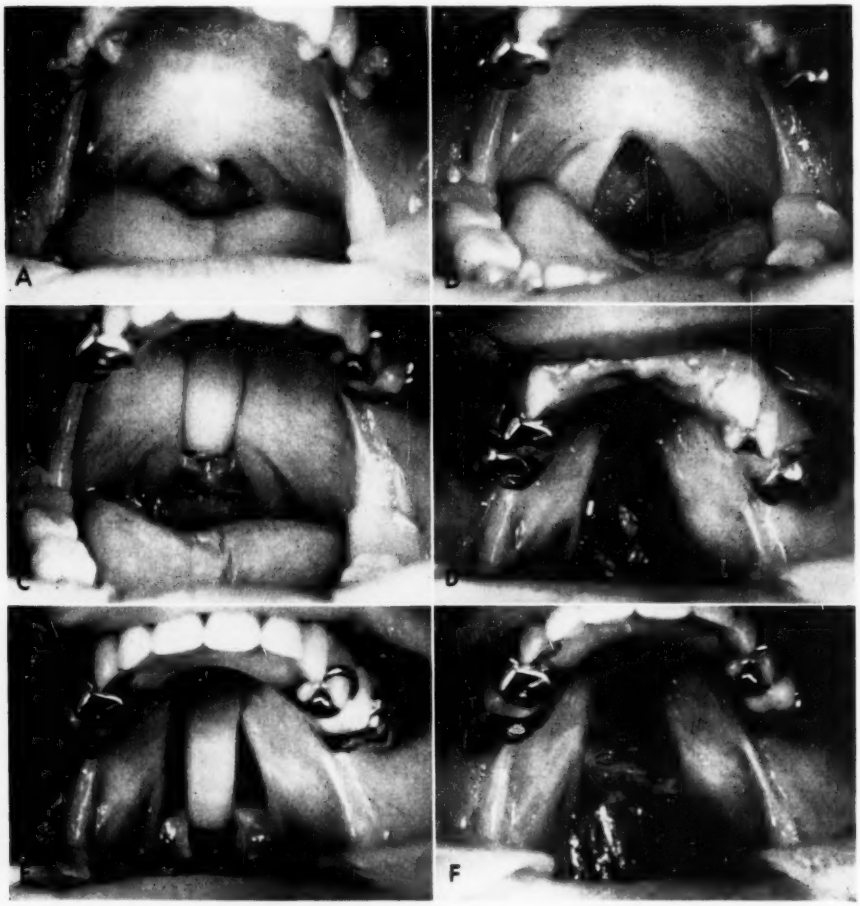


Fig. 8—Palatal area. A: Limited palatal mobility; B: inadequate redivision; C: speech aid in situ; D: after second redivision; E: initial speech aid in situ; F: modified speech aid in situ

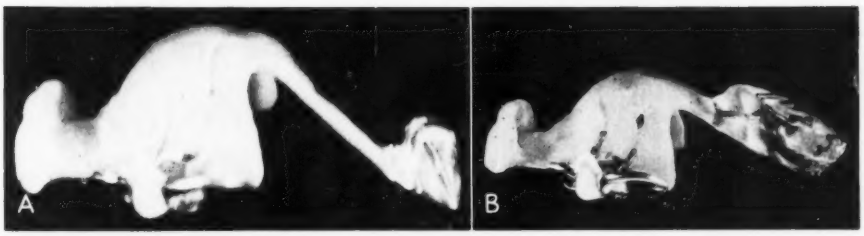


Fig. 9–Lateral views. A: Initial speech aid; B: modified speech aid

posterior area of the hard palate (Fig. 10B) and a satisfactory speech aid was then constructed (Fig. 10C).

Limited corrective surgery for those postoperative conditions that prevent adequate use of a speech aid is regarded as a radical procedure by some surgeons. Some surgeons regard the removal of sublabial adhesions and premaxillary resections as necessary but consider any redivision of

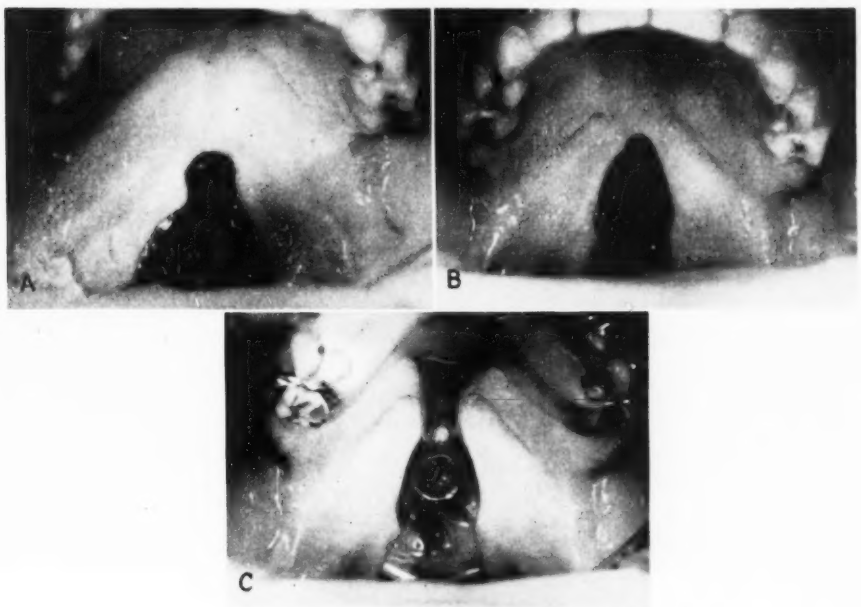


Fig. 10–Occult cleft. A: Palatal view; B: after redivision; C: speech aid in situ

the soft palate postoperatively an extreme procedure.

Since a prosthesis remains the last and only method of reconstruction in many cases of surgical failure, it should be considered judicious and ethical to remove those obstacles that threaten the success of the last resort. Such surgical intervention is necessary because repeated surgical attempts failed to achieve a functional closure.

An adequate, satisfactory speech aid usually is composed of three sections: palatomaxillary, palatovelar and pharyngeal (Fig. 11A). It must (1) subserve oral speech activities, (2) improve facial balance and dental esthetics, and (3) subserve deglutition and mastication. A prosthesis that subserves speech activities will also supplement the biological functions and improve esthetics. The emphasis in prosthetics, then, is the construction of an adequate speech aid.

Such a prosthesis must establish an adequate separation of the oral cavity from the nasal cavity. This prosthetic oronasal separation necessitates an anteroposterior compensation for the degree of deficient structures from the teeth into the pharyngeal cavity near Passavant's cushion (Fig. 11B).

The speech aid must remain in lateral contact with the palatal muscles during repose and activity and provide adequate oral space by being vaulted as much as is anatomically possible. It must be comfortable, light in weight and easily modified and remain *in situ* during oral activation. Any obstacles that threaten the construction of an adequate speech aid must be removed. The acquisition of functional dental occlusion (Fig. 12A and C) may

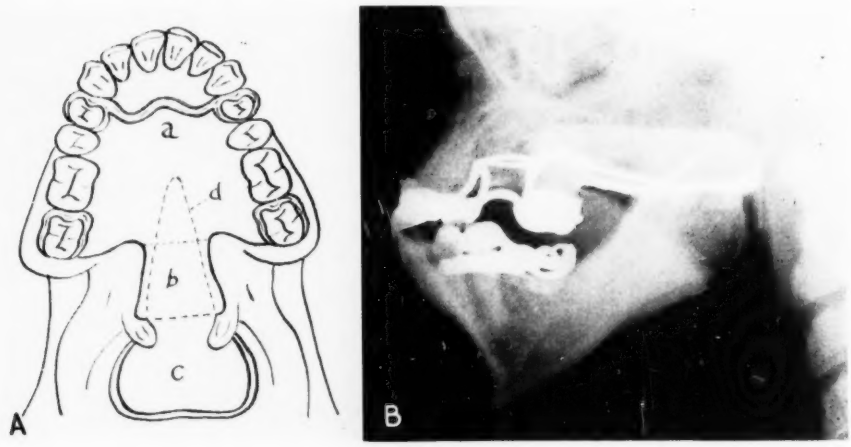


Fig. 11—A: Schematic drawing of a prosthesis: (a) palatomaxillary section, (b) palatovelar section, (c) pharyngeal section, (d) degree of cleft represented by dotted lines. B: Anteroposterior separation achieved by a speech aid on a level with the tubercle of atlas bone

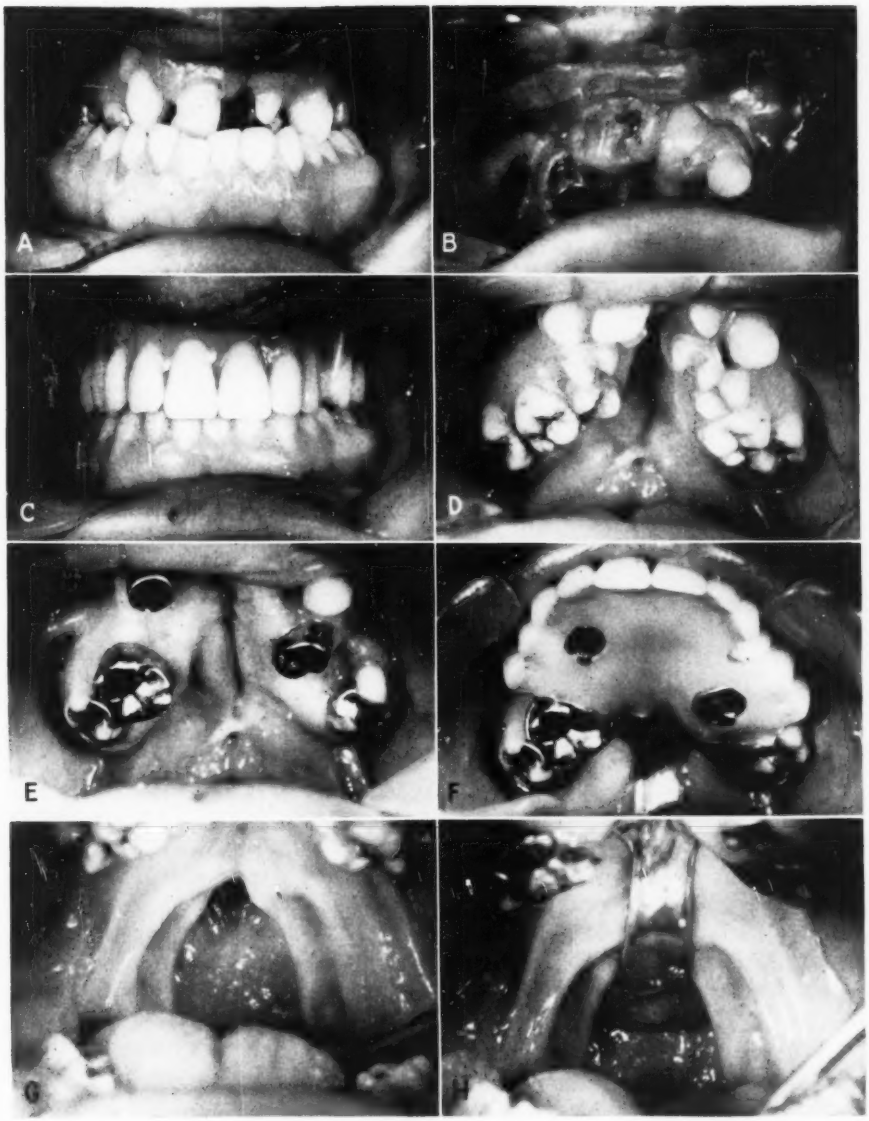


Fig. 12—A: Malocclusion; B: extractions and preparation; C: functional prosthetic occlusion; D: distortion of dental arch; E: dental preparations; F: prosthetic establishment of dental arch and hard palate; G: postoperative palatal condition; H: speech aid in situ

necessitate extractions of teeth only (Fig. 12B) or require the surgical relief of adhesions. The establishment of the contour of the dental arch (Fig. 12D and F) may require extractions and dental restorations (Fig. 12E) or involve the excision of the floating premaxilla or resection of a protruding premaxilla. In certain palatal conditions replacement of an adequate oronasal separation laterally and anteroposteriorly may be possible (Fig. 12G) which will at the same time not impede the construction of an adequate speech aid (Fig. 12H) or necessitate a palatal redivision to assure a satisfactory prosthesis.

■ *Conclusion*

Oral prosthetics has made a significant contribution to the rehabilitation of cleft palate patients. The altered concepts of surgeons, the research on facial and maxillary growth, the trends in rehabilitation and the technical advancements in the construction of prostheses have made the prosthetic restoration of cleft palate into a science and art.—*Fulton Building.*

Training in dental anesthesia

■ *F. W. Clement, M.D., Toledo, Ohio*

Of late years there has been ever increasing criticism of the administration of general anesthetics in the dental office. It is contended that the dentist or his assistant is usurping the prerogative of the medical anesthetist, that the training of the dentist in this art is inadequate and that as a result the lives of his patients are endangered. There is no doubt that much of this criticism is all too often well founded.

The administration of general anesthetics in the dental office has improved very little since the days when Wells first advocated their use. The poor quality of their administration is emphasized by the periodic attempts by legislative bodies to enact laws to restrict or to abolish their use in a dental office. Fatalities occurring in the dental office are front page copy in the newspapers. This publicity makes the public apprehensive and instills a fear that the dental profession lacks knowledge and skill in the proper use and administration of anesthetics. This reaction in turn arouses a clamor for "controls" which would be detrimental both to the profession and to the public. Fatalities occurring in the dental office, regardless of agent or method employed, are invariably due to inexperienced personnel and inadequate facilities for the treatment of emergencies.

The truth is that the administration of general anesthetics in the dental office

is a service to the public. The requisites for this art are the same as those for skill in any applied science: training and experience. In the past century great advances have been made in all phases of dentistry except that of general anesthesia. The reason is evident: dental schools have failed to provide an adequate teaching program in this subject. Training in general anesthesia is the responsibility of the dental colleges, and it depends on their attitude whether the use of general anesthetics in the dental office will be accepted or will come under a legal ban.

No one objects to the administration of a local anesthetic by the graduate of a dental school although the administration of a local anesthetic is not a foolproof procedure to be learned quickly and applied indiscriminately. It involves such dangers as broken needles, sepsis, injuries to nerve trunks and intravascular injection with possibly fatal consequences. Yet the use of a local anesthetic in the dental office is a standard procedure accepted by professional men and laymen alike. No one questions the dentist's right or ability to employ this form of anesthetic. Why should the administration of a local anesthetic be accepted and that of a general anesthetic arouse a storm of criticism? The answer is simple: the dentist has been trained in the use of the former but not in the latter.

Nurses recognized as anesthetists are employed in many hospitals throughout the United States. Their period of training often is confined to six months in a hospital under the supervision of other nurses trained in anesthetics. It sometimes happens that there is no teaching or supervision by medical personnel. Certainly a much wider and more comprehensive knowledge of medical and allied subjects is required of the graduate of a dental school than of a nurse. There is no reason why a dentist cannot become proficient in the administration of general anesthetics in his office.

Although the student may receive adequate training in the use of local anesthetics during his undergraduate days, his training in general anesthesia is woefully inadequate. Whatever instruction there is usually consists of a few lectures which often serve only to emphasize the dangers associated with the use of general anesthetics rather than the advantages. The result is that after the student graduates, because of fear or ignorance, he is often reluctant to attempt their use.

On graduation, the present day dentist faces a problem: he has been trained only in the use of a local anesthetic and accordingly must sell this form of relief from or prevention of pain to each and every one of his patients. Soon he realizes that many patients are not suitable subjects for a local anesthetic, perhaps on account of age, temperament or physical condition. Consequently he pursues one of two courses: (1) he refers the patient elsewhere, to the exodontist who administers general anesthetics or to a hospital where general anesthetics are available; or (2) he himself attempts the administration of a general anesthetic. Naturally he is loath to refer any large number of patients to another dentist for operation or for treatment, and it is obviously impractical to refer every patient requiring a general anesthetic to a hospital. Hospital beds are expensive and scarce; often there are long waiting lists;

furthermore, admission to a hospital does not in itself ensure the best in dental anesthetics since many hospital anesthetists are not expert in open mouth anesthesia for dental procedures. Another fact to be considered is that professional or medical anesthetists are far too few in number to meet the demand for their services by the larger hospitals throughout the country; only rarely are their services available for daily administration of anesthetics in the dental office.

If the dentist decides to use a general anesthetic in his office, he follows one of two courses: either he hires a nurse or a technician, who may or may not be competent, to give the anesthetic; or he purchases a gas apparatus, receives a book of instructions, perhaps watches a demonstration by a salesman and proceeds to administer the anesthetic himself. There is no reason for wonder if the results leave much to be desired, if they are unsatisfactory or even dangerous. Frequently after one or more "scares" the dentist gives up, relegates the gas machine to a corner to collect dust and resigns himself to confining his efforts to local anesthetic agents.

If the graduate or practicing dentist should decide to acquire some knowledge of general anesthesia and some proficiency in administering general anesthetics, unfortunately there are few opportunities for him to do so. Training centers and facilities for postgraduate teaching of general dental anesthesia are scarce. Short courses of one to two weeks can cover only the merest fundamentals. As a rule, therefore, a student must acquire skill and proficiency only from experience, often bitter and at the expense of his patients.

Only rarely does it happen that a fortunate student with time and money to spare obtains in a general hospital a dental internship, part of which is devoted to general anesthesia. The length of training offered is usually inadequate; furthermore, hospital anesthetic methods differ considerably from those to be employed in the dental office. One other rare source of training is the office of an established exodontist.

■ *Suggestions for the Teaching of General Anesthesia in Dental Schools*

The first requisite for the teaching of general anesthesia in dental schools is the recognition by the dental profession of the importance of making the subject an integral part of the dental curriculum on the same status as any other subject in an approved school of dentistry. Unless and until this is done, no real progress can be made. It must be recognized also that inclusion of this subject in the dental curriculum does not imply that every dental student on graduation automatically becomes an expert anesthetist any more than that every graduate is an expert exodontist. It would insure, however, that each graduate would have a grasp of the necessary fundamentals and be in a position to further this knowledge. With the present inadequate methods of teaching general anesthesia it is doubtful if more than one per cent of students on graduation have any real interest in this subject.

The courses, which would include both general and local anesthesia, should be divided as follows:

1. The junior year curriculum should be didactic; it should consist of a

series of lectures on the various anesthetic agents: their composition and mode of action, their indications and contraindications, the dangers and complications attending their use; a second series of lectures should include the physiology of respiration and circulation and a study of the autonomic nervous system. If facilities are available, students should be given the opportunity to observe the work of anesthesia clinics.

2. The senior year curriculum should be practical; it should consist of lectures on the indications for anesthesia; on the specific anesthetic agents suitable for use in the dental office such as nitrous oxide-oxygen, nitrous oxide-oxygen with ether, vinyl ether or trichloroethylene; the use of thiopental sodium for induction purposes; and details of technics of administration illustrated whenever possible by motion pictures. Each student should administer anesthetics under supervision as many times as possible. Practical experience is valuable in direct ratio to the number of applications of knowledge. Only a few instances of successful application may instill false confidence.

For the graduate wishing to specialize or to become proficient in general anesthesia, further training should include enrollment in a dental college for a postgraduate course in anesthesia or in the anesthetic department of a general hospital for a period of nine to 12 months under the supervision of the chief of that department. This training likewise should consist both of theory and of practice. The student so enrolled would attend the lectures given to the resident medical anesthetists. His practical work, however, would be confined to those agents and methods suitable for use in the dental office. Such a student would not be required to learn spinal anesthesia, regional blocks such as brachial plexus or stellate blocks but would be taught the use and administration of nitrous oxide-oxygen, nitrous oxide-oxygen with ether, vinyl ether and trichloroethylene; the use of thiopental sodium chiefly for induction; and oral and nasal endotracheal methods. Emphasis should be placed on the use of anesthetics for oral cases. The student would be expected to participate in any research in progress. He should also administer anesthetics in outpatient dental clinics.

Completion of such a course would provide excellent background, training and experience and would qualify the trainee for the administration of general anesthetics in the dental office. This course of study would not conflict in any way with the training of medical anesthetists since it would be designed to qualify the general student, not for the routine administration of anesthetics in a hospital, but for the administration of anesthetics suitable for use in a dental office. An alternative course could consist of six months' training as outlined above followed by six months in the office of an exodontist.

For the graduate dentist who has been in practice for a number of years and who wishes without giving up his practice entirely to learn or to improve methods of administering anesthetics, a refresher course should be planned which would have the following requirements:

1. Attendance in an adjacent dental school at the lectures and clinics planned for senior year students.

2. Attendance at an outpatient dental clinic two or three afternoons a week for administration of anesthetics under supervision. This practical training should be supplemented by individual reading and study.

3. Part-time training in the office of a trained dental anesthetist or an exodontist.

The University of Pittsburgh Dental School was the first school in the United States to have a separate department of anesthesia. This department is better organized and further advanced than that of any other dental college on the continent. It is a result of the efforts and years of service of Dr. L. M. Monheim of that department.

In the junior year, 16 lectures are given on the following subjects: regional and local anesthesia, anatomy of the trigeminal nerve, technics of various blocks with slides and demonstrations in which students perform the actual blocks on each other, pharmacology of agents employed and dangers and complications attending their use.

In the senior year, 32 hours are devoted to general anesthesia with detailed studies of respiration, circulation, theories of anesthesia, premedication, postanesthesia medication, balanced anesthesia, shock and anoxia. Also included in this year of study is a detailed analysis of drugs suitable for use in the dental office, such as nitrous oxide-oxygen, vinyl ether, thiopental sodium and trichloroethylene.

In addition to the class work there is available a dental outpatient department which has an annual average of 650 patients requiring local or general anesthetics. The majority of the administrations of local and general anesthetics are performed by the postgraduate students specializing in anesthesia.

An intensive postgraduate course of one year is open to two or three students. These students pay their tuition directly to the University and receive a master's degree upon completion of the course provided that their previous academic records have been satisfactory. If not, they receive a certificate of proficiency in anesthesia from the hospital where they received their training.

Upon graduation the dentist is in a position to pursue further training in anesthesia if he so desires. If he has decided to specialize in exodontics, he is prepared to spend one or more years of postgraduate work to become proficient in this specialty; he should adopt a similar attitude toward general anesthesia. His future success and satisfaction will depend upon this period of postgraduate training; he will get out of it just what he puts into it.

The graduate who wishes to specialize in oral surgery must be trained in anesthesia also. Most oral surgeons are willing to admit that their major problem is not the operation but the administration of the anesthetic. Many are dependent on anesthetists, nurses or technicians, whose financial demands are in direct proportion to their efficiency and length of service. Frequent replacement of the anesthetist is another problem. Unless the oral surgeon is trained in anesthesia, he is at the mercy of the technician. He needs this knowledge also for his own peace of mind and for legal protection. If he is not trained, the best solution to this problem is to use the services of another dentist who

has specialized in anesthesia and who can take over full responsibility for that part of the work.

For the dentist who is well trained in all phases of dental anesthesia, there are numerous worth-while opportunities. Every dental faculty should have such a specialist on its staff for the teaching and supervision of anesthesia. The services of a dental anesthetist would be invaluable in the office of the exodontist. Furthermore, the dental anesthetist could build up a lucrative practice by giving anesthetics in various dental offices in any large town or city.

His training would be of great value also in cooperative dentistry. It is seldom practical for a dentist to administer or even to supervise the administration of an anesthetic and to perform extractions simultaneously. An extraction which seems simple at first may become difficult and prolonged. In such a case the administration of the anesthetic is of secondary concern to the dentist, often to the detriment of the patient. The ideal arrangement is for two or more general dentists to share an office or to have offices close together. The dentist trained in anesthesia then can administer general anesthetics for the others who have had insufficient training and the others can do the extractions for him.

■ *Summary*

The above is a brief outline of a long-range program designed to make graduate dentists proficient in the art of anesthesia as applied to dental offices and clinics. Briefly the objectives are as follows:

1. To provide adequate training in the fundamentals of general as well as of local anesthesia in the junior and senior years of dental training.

2. To provide advanced postgraduate courses in dental colleges for those desiring to specialize in anesthesia.

3. To encourage students to specialize in this work and to offer a degree or a statement of proficiency on completion of a special course.

4. To have one member of every dental faculty a trained dental anesthetist whose duties include the teaching of methods of anesthesia to undergraduate and graduate students.

5. To establish a professorship of anesthesia in every dental school.

6. To have the American Board of Oral Surgery list training in anesthesia as a prerequisite for certification.

7. To bring about the cooperation of local and national dental societies with medical academies and organizations for the postgraduate training of dental graduates in general anesthesia.—2228 *Ashland Avenue.*

Measurements of the ramus of the mandible in relation to the inferior alveolar block

■ *Niels B. Jorgensen,* D.D.S., Los Angeles, and John E. Hughes,† M.D., Loma Linda, Calif.*

The inferior alveolar block was first administered by Halstead, in 1885, but it was not until the discovery of procaine by Einhorn, in 1904, that this block gained clinical importance in dentistry and oral surgery. All the earlier authors had one thing in common in their directions for giving this injection and that was their absolute specificity. They gave definite rules for the technic, ignoring all deviations from the "normal," with the consequence that now and then failures occurred.

In the various directions for the technic of this block the occlusal plane, the internal oblique line and the lingula of the mandible form important landmarks. Braun[1] in 1914, Fischer and Riethmüller[2] in 1923, Labat[3] in 1922 and Smith[4] in 1920 all gave the point of needle insertion as 1 cm. above the occlusal plane of the teeth. Lindsay[5] gave the name "coronoid notch" to the depression in the anterior border of the ramus of the mandible. Nevin and Puterbaugh[6] in 1948 stated that a line through the deepest point of the coronoid notch and running parallel with the occlusal plane would cross the mandibular sulcus just above the lingula. Seldin[7] in 1947 said that the deepest point of the coronoid notch is in a direct horizontal line with the mandibular foramen. Sicher[8] in 1946 stated that the mandibular foramen is situated in the extension of the occlusal plane of the lower molars and that the injection should be made not more than 3 to 4 mm. above the plane. In 1949 he[9] said that, in order to reach the lowest part of the groove of the mandibular neck (mandibular sulcus), the needle should be placed parallel to and only slightly above the occlusal plane.

The depth of injection has also been given as rather specific. Braun[1] stated it to be 2 to 2.5 cm., Fischer[2] 1.5 cm., and Posner,[10] even as late as 1941, ¾ in.

In 1919 Cook[11] published his studies

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1. Braun, H. Die Lokalanasthesie, ihre wissenschaftlichen Grundlagen und praktische Anwendung. 4. Auflage. Leipzig, Johann Ambrosius Barth, 1914, p. 255.

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8. Sicher, H. The anatomy of mandibular anesthesia. J.A.D.A. 33:1541 (Dec.) 1946.

9. Sicher, H. Oral anatomy. St. Louis, C. V. Mosby Co., 1949, p. 416.

10. Posner, J. J. Simplified technique for local anesthesia. Special Issue Army Dental Bulletin (Nov.) 1941.

11. Cook, W. A. Anatomical measurements relative to conductive anesthesia with procaine and alcoholic injection for tic douloureux. J.N.D.A. 6:1030 (Nov.) 1919.

on mandibles relative to the inferior alveolar block. He found a great variation in the width of the rami measured and located the mandibular sulcus as lying in a plane passing at right angles to the ramus through the deepest point of the coronoid notch in all cases. In 1938 Simon and Kömives[12] published results of similar investigations, in which they found the lingula to be lying in a plane of the least width of the ramus. They used the lingula instead of the center of the sulcus as a landmark but otherwise came to similar conclusions; that is, that great variations in dimensions exist.

In the present study the saddle-like smooth bony notch connecting the upward and backward projection of the lingula with the medial surface of the ramus has been found to be an important landmark. This feature of the mandible is called the "lingular notch," indicated by an arrow in Figure 1. The lingula and also the mandibular sulcus vary greatly both in shape and size, but the lingular notch was found to be a constant and useful guide to the mandibular sulcus for the inferior alveolar injection. Even though variations in the lingula affect the form of the lingular notch, it is always present and actually marks the ideal lane for the needle into the mandibular sulcus.

About 50 disarticulated Indian mandibles from the San Diego Museum of Man were first studied in the present investigation, and then about 400 disarticulated half-mandibles from the College of Medical Evangelists School of Medicine were measured. The results were similar to those of Cook and of Simon and Kömives in the demonstration of great variations in the width of the ramus. They found a greater variation in the heterogeneous material, where the range was 23 mm., than in the homogeneous mandibles, where the range was 19 mm. In the heterogeneous mandibles of the present study (all adult mandibles as in the Cook and Simon and Kömives studies) there is also a range of 23 mm., with the width varying from 19 mm. to 42 mm., and in the homogeneous a range of only 7 mm., with the width varying from 33 mm. to 40 mm. Thus the present homogeneous material varied less than theirs. Simon and Kömives stated, "It was found that the line of smallest width met the lingula in every instance." In the present series, however, the lingular notch was above this line in most cases.

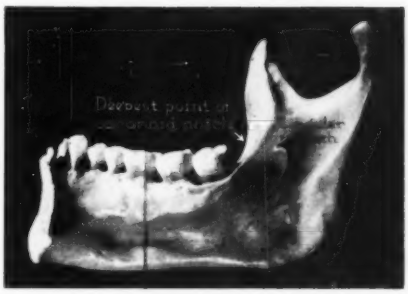

Fig. 1—The lingular notch is located in a plane parallel to the occlusal plane and passing through the deepest point of the coronoid notch

The deficiencies of the material first used in the present study were realized early, since all mandibles were of adults, so that factors of growth and development could not be studied, and all were disarticulated, so that the possible effects of

12. Simon, B., and Kömives, O. Dimensional and positional variations of the ramus of the mandible. J.D. Res. 17:125 (April) 1938.

Table 1
Adult skulls with teeth in normal occlusion-measurements in millimeters

Skull no.	O		B		D		A		N		A/N	
	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left
C 57	4.0	3.6	0.0	0.0	6.0	3.7	16.0	15.7	33.0	32.0	0.48	0.49
C 58	6.7	3.8	0.0	0.0	4.0	2.0	26.5	27.5	32.0	31.5	0.81	0.87
C 59	13.0	10.8	0.0	1.5	6.0	7.5	17.5	17.5	33.0	33.0	0.53	0.53
C 60	6.4	5.5	1.5	0.0	4.0	1.0	18.0	19.0	34.0	33.0	0.53	0.57
C 61	7.0	6.4	0.0	0.0	4.5	1.0	14.0	14.5	27.0	28.0	0.52	0.52
C 62	6.0	6.0	0.0	0.0	7.0	4.0	19.0	18.5	33.0	33.0	0.57	0.56
C 63	4.5	4.5	0.0	0.0	3.0	4.0	16.0	15.0	28.0	30.0	0.57	0.50
C 64	6.7	8.1	1.0	0.0	5.0	4.0	18.0	16.0	34.0	34.0	0.53	0.47
C 65	6.0	3.6	0.0	0.0	2.5	3.0	17.5	17.0	31.0	33.0	0.57	0.52
C 67	8.8	11.0	0.0	0.0	3.0	1.0	15.0	16.5	31.0	32.0	0.49	0.52
C 68	7.2	4.8	1.0	0.5	5.0	5.0	18.5	18.0	31.0	32.0	0.60	0.56
C 69	5.0	4.6	1.0	2.0	3.0	1.0	17.0	18.5	26.0	30.0	0.65	0.62
C 70	7.3	5.2	2.5	0.0	6.0	4.5	18.0	17.0	31.5	31.0	0.57	0.55
C 71	6.0	7.0	0.0	0.0	0.0	1.0	15.0	15.5	30.5	31.5	0.50	0.49
C 72	8.3	8.3	0.0	0.0	3.0	4.5	17.0	17.5	33.0	35.0	0.51	0.50
C 73	6.3	7.3	0.0	2.0	4.0	4.5	16.0	17.0	32.0	31.0	0.50	0.55
C 75	16.0	13.0	1.0	0.0	1.0	2.5	17.0	17.0	33.0	33.0	0.51	0.51
C 76	5.0	4.0	0.0	0.0	1.0	-1.0	13.5	14.5	28.0	29.0	0.48	0.50
C 77	7.0	5.9	0.0	0.0	3.0	3.5	20.0	20.0	35.5	36.0	0.56	0.56
C 79	5.7	5.3	0.5	0.0	5.0	2.5	17.5	16.0	30.0	30.0	0.58	0.53
Mean	7.1	6.4	0.3	0.1	3.8	3.2	17.0	17.3	31.3	31.9	0.55	0.57
S. D. of Mean	2.7	2.6	0.7	0.7	1.8	2.0	2.7	2.7	2.4	1.9	0.08	0.08

malocclusion were ignored. Of the heterogeneous mandibles over 50 per cent were edentulous, and in the remainder the dentition was in different stages of incompleteness. The teeth of the Indian mandibles were in stages of from one-third to complete abrasion of the crowns. In most of this material it was not possible to study the occlusal plane of the teeth in its relation to the other measurements. It is believed the mandibles studied by Cook and by Simon and Kömives suffered from similar incompleteness.

In order that more suitable material could be studied, Spencer R. Atkinson of Pasadena, Calif., gave access to his private collection, in which about 1,200 skulls with complete dentures and without caries are arranged according to type of occlusion. His collection also contains skulls from children of various ages. Since the number of skulls actually measured is not large, the following report is of a preliminary nature. Measurements were made of 25 adult mandibles with teeth in normal occlusion, 12 with Class II mal-

Table 2
Adult skulls with teeth in Class II malocclusion-measurements in millimeters

Skull no.	O		B		D		A		N		A/N	
	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left
C 44	4.9	9.5	0.0	1.0	5.0	4.0	16.0	15.0	29.0	28.0	0.55	0.53
C 47	11.0	13.0	3.0	1.0	7.0	5.0	20.0	20.0	30.0	31.0	0.66	0.65
C 34	6.1	6.5	1.0	0.0	6.0	4.0	16.0	18.0	25.0	28.5	0.64	0.63
A 232	3.9	4.5	0.0	0.0	4.5	4.0	18.0	19.0	35.0	36.0	0.51	0.53
A 167	7.5	6.8	0.0	0.0	3.0	3.0	18.0	17.0	32.5	34.0	0.55	0.50
Mean	6.7	8.1	0.8	0.4	5.1	4.0	17.6	17.6	30.3	31.5	0.58	0.56
S. D. of Mean	2.3	2.9	1.2	0.5	1.4	0.6	1.5	1.9	3.4	3.1	0.21	0.16

Table 3
Adult skulls with teeth in Class III malocclusion-measurements in millimeters

Skull no.	O		B		D		A		N		A/N	
	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left
C 43	12.1	9.0	1.0	3.0	3.0	4.0	20.0	19.0	36.0	36.0	0.53	0.52
C 228	7.7	6.8	2.0	3.0	5.0	6.0	17.0	17.0	32.0	31.5	0.53	0.54
C 202	11.9	13.2	4.5	5.0	8.0	8.0	16.0	17.0	30.0	29.0	0.53	0.58
C 227	11.3	13.0	3.0	5.0	8.0	8.0	18.0	18.0	29.0	29.0	0.62	0.62
C 238	7.9	6.3	0.0	3.0	1.0	3.0	20.0	21.0	38.0	40.0	0.52	0.52
C 226	8.7	10.0	1.0	5.5	3.0	6.5	17.0	16.0	32.0	31.0	0.53	0.52
Mean	9.9	9.7	1.9	4.1	4.7	5.9	18.0	18.0	32.8	32.8	0.53	0.52
S. D. of Mean	1.9	2.7	1.5	1.3	2.6	1.9	1.5	1.6	3.2	4.2	0.09	0.05

occlusion, 12 with Class III malocclusion, and also eight mandibles of children in the age group from 2 to 10 years. Only the measurements from Dr. Atkinson's skulls are listed in the Tables. Figure 2 serves as a key to the Tables.

Tables 1 to 3, Column O, show that in the adult mandibles the distance from the occlusal plane upward to the lingular notch is subject to wide variations between the extremes of 3.6 mm. and 16 mm. Column O of Table 4 shows that the variation in the child mandibles is also wide, this variation ranging from 2 mm. to 11 mm.

Table 1, Column B, shows that among the adult skulls, with teeth in normal occlusion, the lingular notch lies exactly in a plane parallel to the occlusal plane and passing through the deepest point of the coronoid notch on 29 of the 40 rami. The deepest point of the coronoid notch is indicated by an arrow in Figure 2. The mean distance of the notch above the plane for all the mandibles is 0.2 mm., and on one ramus the distance is as great as 2.5 mm. Table 2, Column B, shows that in the adult skulls with teeth in Class II malocclusion the relation of the plane to the lingular notch is substantially as close as in those with normal occlusion. Table 4, Column B, shows that the lingular notch is exactly on the plane in all of the child skulls. In the adult skulls with teeth in Class III malocclusion, however, the relation is different, since Table 3, Column B, shows that the lingular notch is at a higher point. On the average mandible with teeth in Class III malocclusion the notch is 3.0 mm. above the plane parallel to the occlusal plane and passing through the deepest point of the coronoid

Table 4
Children's skull measurements in millimeters

Skull no.	Years of age	O		B		D		A		N		A/N	
		Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left
A 54	2	5.0	5.5	0.0	0.0	2.0	2.5	12.0	11.0	18.0	17.0	0.62	0.65
A 70	3	2.0	2.0	0.0	0.0	3.0	3.0	13.0	13.0	20.0	20.0	0.62	0.60
A 71	3	3.0	4.3	0.0	0.0	3.0	3.0	13.0	13.0	20.0	20.0	0.65	0.65
A 80	5-6	6.0	6.0	0.0	0.0	1.0	1.0	12.0	14.0	23.0	25.0	0.52	0.56
A 95	6	6.5	5.0	0.0	0.0	1.0	2.0	16.0	16.0	25.0	26.0	0.64	0.62
A 114	8	4.0	10.0	0.0	0.0	1.0	2.0	16.0	16.0	24.0	24.0	0.67	0.67
A 104	9	6.5	7.2	0.0	0.0	2.0	2.5	14.0	15.0	25.0	26.0	0.56	0.58
A 115	10	5.8	11.0	0.0	0.0	2.0	2.0	17.0	17.0	30.0	29.5	0.57	0.57

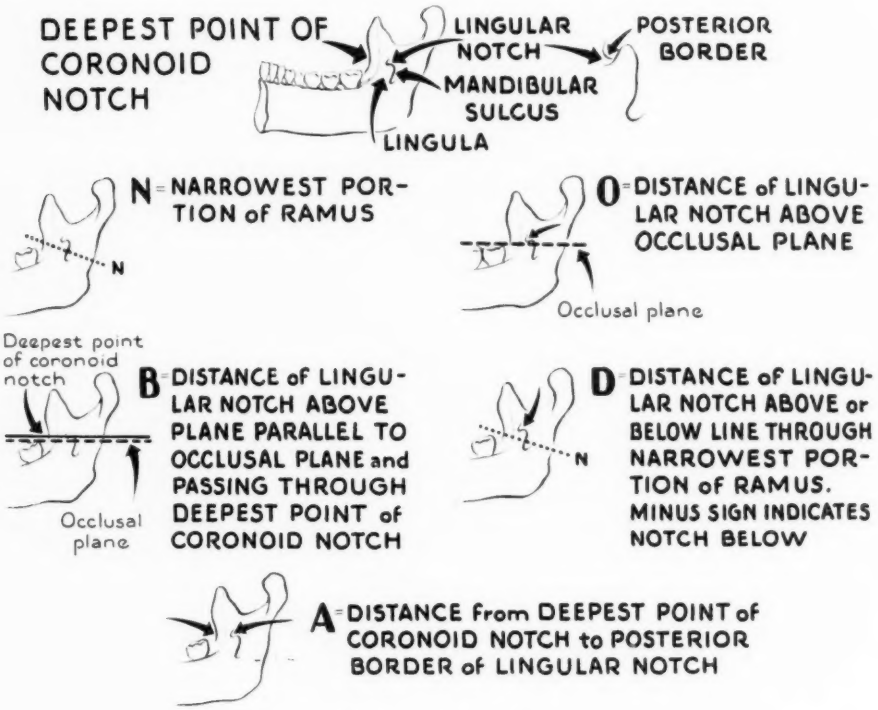
DEEPEST POINT OF CORONOID NOTCH
LINGULAR NOTCH
POSTERIOR BORDER
MANDIBULAR SULCUS
LINGULA
N = NARROWEST PORTION of RAMUS
N
O = DISTANCE of LINGULAR NOTCH ABOVE OCCLUSAL PLANE
Occlusal plane
Deepest point of coronoid notch
B = DISTANCE of LINGULAR NOTCH ABOVE PLANE PARALLEL TO OCCLUSAL PLANE and PASSING THROUGH DEEPEST POINT of CORONOID NOTCH
Occlusal plane
D = DISTANCE of LINGULAR NOTCH ABOVE or BELOW LINE THROUGH NARROWEST PORTION of RAMUS. MINUS SIGN INDICATES NOTCH BELOW
N
A = DISTANCE from DEEPEST POINT of CORONOID NOTCH to POSTERIOR BORDER of LINGULAR NOTCH

Fig. 2—Key to Tables 1-4

notch. On one ramus the notch is 5.5 mm. above the plane.

Tables 1 to 3, Column D, show that the lingular notch is above the line through the narrowest portion of the ramus in all the adult specimens except on a single ramus of one mandible with teeth in normal occlusion, where it was 1 mm. below. Column D of Table 4 shows that in the child specimens the lingular notch is above the line through the narrowest portion of the ramus in all specimens.

Column A in Tables 1 to 3 shows that the distance from the deepest point of the coronoid notch to the posterior border of the lingular notch on the adult mandibles varies from 13.5 mm. to 27.5 mm. The same column in Table 4 shows a great variation in the child mandibles also.

Measurements of the distance from the internal oblique line or temporal crest to the posterior border of the lingular notch have not been included since this crest is often rounded and sometimes even absent. However, little difference in this measurement between the skulls of the children and the adults was observed.

Tables 1 to 3, Column N, show that the narrowest portion of the ramus in the adult skulls with normal occlusion and with Class II and III malocclusion varies from 25 mm. to 40 mm. and that in the child mandibles the width tends to increase with age.

A comparison of Column A/N in Table 4 with the same column in Tables 1 to 3 shows that the distance from the deepest point of the coronoid notch to the lingular notch is proportionally greater in the child mandibles than in the adult mandibles.

■ *Summary*

Measurements are presented of homogeneous and heterogeneous disarticulated adult mandibles; of articulated adult mandibles with complete dentition and with teeth in normal occlusion, Class II and III malocclusion, and measurements of child mandibles.

It was found that in adult mandibles, with teeth in normal occlusion and Class II malocclusion, the lingular notch is located in or close to a plane parallel to the occlusal plane and passing through the deepest point of the coronoid notch. Figure 2 illustrates this finding. This was also found to be true in children's mandibles, but not in adult mandibles with Class III malocclusion, which forms an exception to this rule since the lingular notch must be expected in a higher plane. Also, it was observed that the distance from the anterior border of the ramus to the posterior border of the lingular notch varies between the extremes of 10 mm. and 20 mm. and that this distance compared with the total width of the ramus is relatively larger in children's mandibles. The distance from the plane through the deepest point of the coronoid notch to the occlusal plane was found to be no greater in the Indian mandibles with attrition of the entire crowns of the teeth than in mandibles with perfect dentition. This seems to confirm the opinion of Sicher[13] that the occlusal plane is a constant.

■ *Conclusions*

It seems evident from the data presented that the approach for the inferior alveolar block should be along a plane parallel to the occlusal plane and passing through the deepest point of the coronoid notch, irrespective of age, except in mandibles with Class III malocclusion, where the lingular notch must be expected at a higher location. The variations in the distance from the anterior border of the ramus to the posterior border of the lingular notch should rule out a fixed depth of injection. In children the lingular notch is located relatively closer to the posterior border of the ramus than in the adult, but it is still found in a plane parallel to the occlusal plane and passing through the deepest point of the coronoid notch, the same as in adults.

13. Sicher, H. Oral anatomy. St. Louis, C. V. Mosby Co., 1949, p. 276.

Effect of chlorophyll ointment on postextraction healing

■ *Boaz Shattan, D.D.S., and Austin H. Kutscher, D.D.S., New York*

Tam and Clark[1] immediately after removing 24 impacted lower third molar teeth filled the socket cavities with a chlorophyll-containing ointment and sutured the wounds. They reported that in eight of the 24 operations there was deleterious activity of the chlorophyll ointment on the healing of the wounds, an activity which consisted either of severe swelling with a sealed-in abscess or of foul osteitis. No controls were included in the experiment. Since their observations on the toxicity of chlorophyll were at variance with previous reports appearing in the medical literature, this present study was made in an attempt to clarify further the effect of chlorophyll on postextraction wound healing.

■ *Method*

Eighty patients, aged 15 to 60, were observed. In each case, after exodontia a chlorophyll-containing ointment was placed in one or more sockets; at the same time in the same number of sockets in the same patient no postextraction medication was placed. The chlorophyll ointment was placed in a total of 102 sockets; 100 comparable sockets were left untreated. In no case were sutures used. In postoperative visits from one to seven days after extraction, all patients were observed for evidence of delayed healing in the chlorophyll-treated sockets and in the untreated sockets.

■ *Results*

In recording observations on the patients' charts, independent observers, who were unaware of the presence or absence of socket medication, noted that healing was delayed in one socket in each group. This delay in healing was apparently caused in both cases by loose bone spicules.

■ *Conclusion*

The use of chlorophyll ointment as a postoperative medication in "normal" sockets has no deleterious effect on the rate of healing. The difference between these observations and those of Tam and Clark perhaps may be attributed to a possible change in the ointment base, to ointment contamination in the previous study or to the fact that in their series the ointment was sealed in the sockets by the use of sutures.

This study was supported in part by a grant in aid from the Rystan Company, Mount Vernon, N. Y. The chlorophyll-containing ointment used in this study was supplied by the Rystan Company.

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1. Tam, Joseph C., and Clark, Henry B., Jr. Use of chlorophyll ointment in impacted third molar wounds. J. Oral Surg. 9:237 (July) 1951.

Roentgenographic localization of the mandibular canal

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Oral surgery can be performed more comfortably and scientifically when the operator is thoroughly informed about the structure of the tooth to be extracted and of the tooth's relationship to the surrounding structures. Various roentgenographic technics have been available to provide the oral surgeon with most of the information required for the skillful removal of mandibular third molars, but none was adequate for the roentgenographic localization of the mandibular canal relative to the root apexes of the third molar. The technic reported in this paper was designed to supplement existing localization procedures.

The root structure of the mandibular third molar is highly variable. This molar often occurs with one, two or three distinct roots. Of the root formations listed, the latter is the least common and also presents the greatest difficulty when localization procedures are employed.

Miller's[1] localization technic requires that two roentgenograms be made of the area under investigation: (1) a periapical view, to establish the mesial-distal and superior-inferior relationship between a fixed landmark and the object to be localized, and (2) an occlusal view, to determine their lingual-buccal relationship. Occlusal roentgenograms of the mandibular third molar region do not portray the mandibular canal, because the crown of the tooth is superimposed over the canal and root apexes. This superimposition nullifies the effectiveness of Miller's technic for localizing the mandibular canal relative to the root apexes of the third molar.

The usual application of Clark's[2] localization technic requires that an initial roentgenogram be made of the region, then the horizontal angulation of the roentgen beam be changed and finally a second film be exposed. When the roentgenograms are studied, a relative displacement between a fixed landmark and the hidden object should be apparent. If the hidden object has apparently moved in the same direction that the head of the x-ray machine moved in exposing first the initial film and finally the second film, then, according to Clark, the hidden object is located to the lingual side of the landmark.

When either the landmark or the hidden object is composed largely of approximately horizontal edges or surfaces, a change in the horizontal angulation of the roentgen beam will produce little or no apparent displacement between the two

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1. Miller, F. D., Personal communication, February 21, 1952.

2. Clark, C. A., A Method of Ascertaining the Relative Position of Unerupted Teeth by Means of Film Radiographs, *Odont. Sec. Roy. Soc. Med. Proc.* 3:85, 1909-1910.

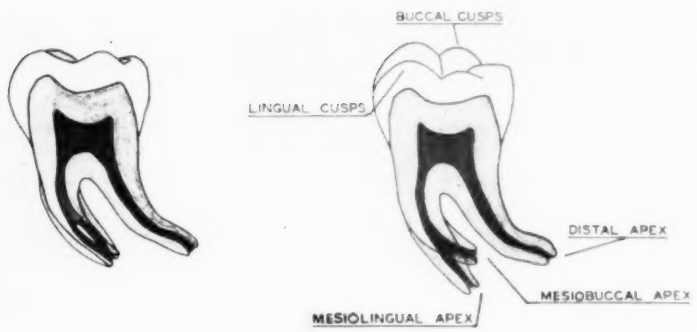

Fig. 1.—Left: Profile view of mandibular right third molar illustrating the superimposition of the lingual and buccal cusps, and of the mesiolingual and mesiobuccal apexes. Right: Roentgenogram of the same tooth produced with a 20 degree upward change in the vertical angulation of the roentgen beam. The buccal cusps and the mesiobuccal root apex have been shifted to positions above the lingual cusps and the mesiolingual root apex, respectively

structures. With the usual interpretation of Clark's principle, no apparent displacement between the landmark and the hidden object would indicate, erroneously, the two structures to be in contact. Generally, in the mandibular third molar region, the path of the mandibular canal is more nearly horizontal than vertical. Therefore, the routine application of Clark's localization technic, involving a horizontal angulation shift, is inadequate for localizing the horizontally inclined mandibular canal relative to the root apexes of the third molar.

If a lingual object is roentgenographed while situated directly behind a buccal object, the images of the two will be superimposed. Under certain circumstances such superimposition of the two images is advantageous, but often it is undesirable. When it is beneficial to move the image of the buccal object from the image of the lingual object, the angulation of the roentgen beam must be altered. By changing the horizontal angulation so the beam is directed in a more distal direction, one will project the image of the buccal object distal to the lingual object's image. Changing the vertical angulation so that the beam is directed in a more upward direction will project the image of the buccal object above that of the lingual object. In general, the roentgenographic image of a buccal object can be shifted in any direction, relative to the image of a lingual object, by simply projecting the roentgen beam in that desired direction. The foregoing rule will be referred to as the "buccal object rule" in the remainder of this paper.

Drawings of roentgenograms of a three-rooted mandibular right third molar are shown in Figure 1. The profile view (Fig. 1, left) was produced by directing the central ray of the beam parallel to the occlusal surface of the tooth. Figure 1,

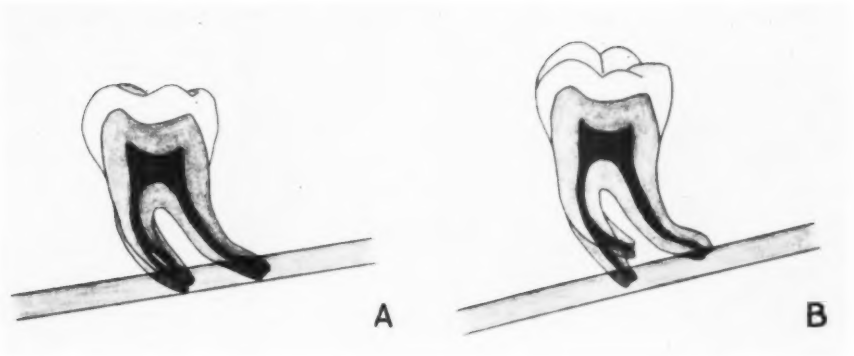

Fig. 2.—The mandibular canal lies to the lingual of the three root apexes. A: Profile view. B: Produced with a 20 degree upward change in the vertical angulation of the beam

right, depicts a roentgenogram of the same tooth, produced with a 20 degree upward change in the vertical angulation of the beam. The upward direction of the roentgen beam caused the occlusal surface of the molar to register with the buccal cusps appearing above the lingual cusps on the roentgenogram. From Figure 1, left, alone, it is not possible to identify the mesiobuccal and mesiolingual roots, because they are superimposed. However, in Figure 1, right, which was produced with the beam projected upward, the image of the mesiobuccal root apex appears above that of the mesiolingual root in accordance with the "buccal object rule."

Drawings of roentgenograms of a three-rooted mandibular right third molar and the mandibular canal are shown in Figures 2, 3 and 4.

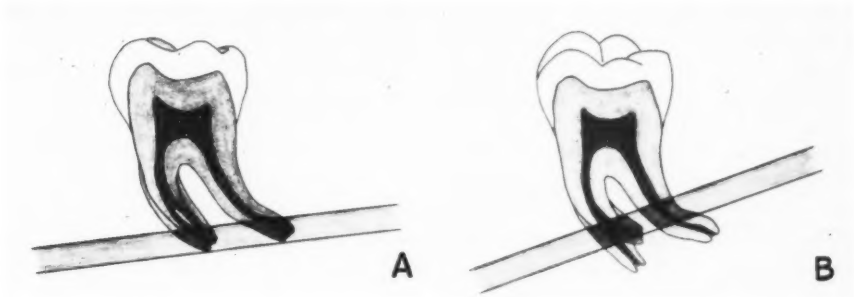

Fig. 3.—The mandibular canal lies to the buccal of the three root apexes. A: Profile view. B: Produced with a 20 degree upward change in the vertical angulation of the roentgen beam

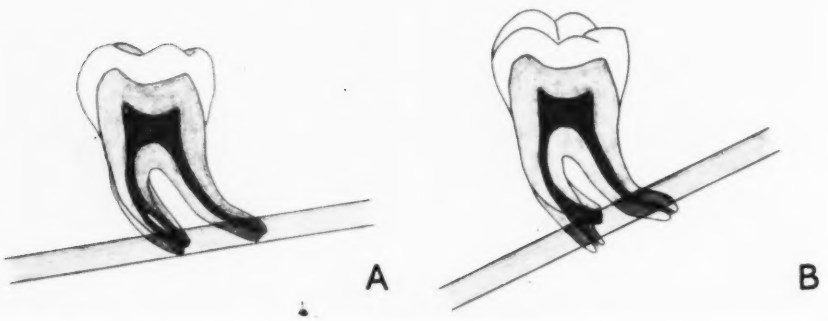

Fig. 4.—The mandibular canal lies between the two mesial roots and buccal to the distal root apex. A: Profile view. B: Produced with a 20 degree upward change in the vertical angulation of the roentgen beam

All three root apexes approximate the inferior border of the mandibular canal in Figure 2, *A*. All of the apexes appear above the inferior border of the mandibular canal in Figure 2, *B*. The roentgen beam was projected upward in Figure 2, *B*; hence the three apexes lie to the buccal side of the mandibular canal, in accordance with the "buccal object rule."

All three root apexes approximate the inferior border of the mandibular canal in Figure 3, *A*. The inferior border of the mandibular canal appears above the apexes of all the roots in Figure 3, *B*. The beam was projected upward in Figure 3, *B*; hence the mandibular canal lies to the buccal side of the root apexes, in accordance with the "buccal object rule."

All three root apexes approximate the inferior border of the mandibular canal in Figure 4, *A*. The inferior border of the mandibular canal appears above the apex of the mesiolingual and distal roots in Figure 4, *B*. The roentgen beam was projected upward in Figure 4, *B*; hence the mandibular canal lies to the buccal side of the apexes of the mesiolingual and distal roots. The apex of the mesiobuccal root appears above the inferior border of the mandibular canal in Figure 4, *B*. The roentgen beam was projected upward in Figure 4, *B*; hence the mesiobuccal root apex lies to the buccal side of the mandibular canal, in accordance with the "buccal object rule."

The mandibular canal lies to the lingual side of the three root apexes in Figure 2, to the buccal side of the three root apexes in Figure 3 and between the two mesial root apexes and buccally to the apex of the distal root in Figure 4.

If a root apex were in contact with the superior border of the mandibular canal, no relative displacement between the two structures could be detected on the localization roentgenograms of the region. The closer the two structures under investigation are located lingually-buccally, the smaller will be their relative displacement on the localization roentgenograms.

■ *Summary*

A roentgenographic technic is described which is useful in localizing the third molar root apexes relative to the position of the mandibular canal. Two roentgenograms of the region are necessary; first, a periapical view of the third molar, and second, a view produced with approximately a 20 degree, either upward or downward, change in the vertical angulation of the roentgen beam. The relative position of the root apexes and the mandibular canal can be determined from the roentgenogram by application of the principle that the roentgenographic image of a buccal object can be shifted in any direction, relative to the image of a lingual object, by projection of the roentgen beam in that desired direction.

Appraisal of a patient preparatory to oral surgery procedures

■ *John W. Wilson, D.D.S., M.S.D., Santa Ana, Calif.*

In addition to the proper regional diagnosis and a skillfully executed surgical technic, there is nothing that contributes more to the prevention of untoward reactions, the protection of the welfare of the patient and the assurance of a favorable prognosis than proper appraisal prior to surgery. A patient undergoing an oral surgical operation that is considered to be hazardous, because of the length of time involved, technical difficulties or a recognized adverse health status, should be hospitalized. When a patient is hospitalized, an appraisal is mandatory. In the busy routine of office practice, however, it is likely to be slighted.

Extraction of a single tooth may be followed by severe complications when done in the presence of serious physical ailments. Failure to obtain a proper history may lead to the use of drugs to which the patient is already sensitized. For example, the use of sulfonamides or penicillin may result in reactions that may assume serious proportions. Failure to elicit a history of postoperative hemorrhagic tendencies may have serious results.

The most serious eventuality, of course, is the sudden death of a patient undergoing either a major or minor procedure. This has happened in the practice of many capable and careful operators in the field of oral and general surgery, and under the most favorable circumstances. A thorough preoperative appraisal does not entirely eliminate surgical risk

but undoubtedly does reduce operative mortality and postoperative complications. Barring certain dramatic accidents that defy prediction, we should be able to grade patients according to the risk involved.

■ *Emergency Surgery*

The oral surgeon must sometimes treat a patient with an emergency condition that is not to the surgeon's liking, a condition involving trauma to other parts of the body as well as to the face. Many acute injuries are complicated by severe general reactions.

A person involved in an accident may experience cerebral hypotension with resultant syncope. The general picture is characteristic: the face is deathly white and exposed portions of the body, especially the forehead, are covered with cold perspiration. There may be convulsive movements of the face or arms or body, and breathing may be shallow or rapid or may cease temporarily. However, fainting is a transient state, which usually lasts for only a few seconds, and does not necessarily preclude surgery.

SHOCK—Shock is a term that may be defined as a general depression of all the functions of the body. It is primarily based on deficiency of the blood vessels throughout the body, hence the term "peripheral circulatory failure," which is often used in describing this reaction. There is evidence that, in shock, a vasoconstrictive action takes place that is associated with an increase in the permeability of the vessel walls, resulting in the escape of an abnormally large volume of fluid into the tissue spaces. From research on the problem, the majority of workers conclude that shock is a circulatory deficiency, neither entirely cardiac nor entirely vasomotor in origin, and characterized by decreased blood volume, decreased cardiac output and increased concentration of the blood.

Briefly, the physiological sequence of shock is as follows:

1. Alteration in the circulation by reason of a decrease in blood volume, due to loss of fluid from the body by hemorrhage, or withdrawal into the tissues of the body or into a cavity.
2. General vasoconstriction which decreases the venous return to the heart, and so results in a decreased output from that organ.
3. Hemoconcentration, due to loss of blood fluids.
4. Fall of the blood pressure, due to the decreased amount of blood in the circulation.
5. Circulatory embarrassment which causes a decrease in tissue oxygenation.

It can be readily appreciated that shock is progressive in character and affects the entire body. A vicious cycle results in a general permeability of the capillaries with further loss of fluid, which, in turn, causes a further lowering of the blood pressure. Unless promptly treated, the loss of fluid, oxygen deficiency and continued low blood pressure may result in death.

The symptoms of shock are: apprehension, a feeling of pronounced weakness, faintness, dizziness and nausea.

The objective findings are as follows:

1. The skin is pale, becoming ashen when the process is prolonged. It is cold,

moist and clammy to the touch. Blood pressure decreases.

2. The pupils are dilated and the eyes have a vacant or glassy stare.

3. As shock progresses an increasing lack of response to stimuli can be observed and stupefaction may ultimately occur.

There are two clinical observations that aid in determining the degree of progression and severity of shock.

1. Repeated blood pressure readings taken at 10 to 15 minute intervals give an excellent index of the patient's condition. Blood pressures that continue to fall are indicative of an increasing depth of shock, while readings that climb steadily toward normal are encouraging signs of recovery.

2. The pulse is fast and feeble and may become imperceptible as the patient's condition deteriorates.

HEMORRHAGE — Hemorrhage alone will produce shock if enough blood is lost, either from external bleeding from body surfaces or into the tissues or body cavities. The loss of blood necessary to produce shock varies from person to person, but sudden loss of a large amount usually produces the following reaction. The initial symptoms are pallor of skin, lips and finger nails, but with little change in the pulse rate or blood pressure. The patient remains conscious and alert. If serious bleeding continues, however, the peripheral vessels can no longer reduce their capacity to accommodate the lowered blood volume; then the pulse rate accelerates and the blood pressure falls. Respiration becomes deep or gasping in severe hemorrhage which distinguishes it from shock due to other causes, when respiration is shallow. If hemorrhage continues, the symptoms develop and more closely resemble those of surgical shock, with varying degrees of restlessness, rapid shallow breathing, cold clammy skin and rapid, feeble pulse, with low blood pressure and prostration.

If the blood is examined during the period of hemorrhage or immediately after it, when restitution of fluid loss has not yet occurred, no change in the composition of the red cells or hemoglobin will show. It is only after the blood volume is restored with fluids that anemia becomes demonstrable, owing to dilution of the cells in the blood stream with a correspondingly low hemoglobin content.

ACTUAL OR POSSIBLE CEREBRAL INJURIES—Once the patient's history reveals a period of unconsciousness, a consultation with a doctor of medicine is mandatory. A subdural hematoma or a bleeding middle meningeal artery may both cause brief periods of unconsciousness with intervening lucid intervals, before the extreme seriousness of the condition becomes apparent. The diagnosis is often missed even by an alert neurosurgeon.

SEVERE INJURIES TO MORE REMOTE PARTS OF THE BODY—Often the treatment of maxillofacial injuries is remanded to a secondary role when other injuries are present. Internal hemorrhage into the abdomen or chest requires urgent definitive treatment, and first aid will usually suffice as far as the maxillofacial injuries are concerned. The same is true of major injuries to the bladder, kidneys, intestines, spine or extremities.

■ *Emergency Treatment*

In the severely injured patient, the risk is great and treatment is limited to care of the patient's general condition. It may be obligatory, however, to carry out the following oral surgical procedures:

1. Clearing the mouth and pharynx of all obstructions, such as dislodged bridgework, dentures, clotted blood or fragments of broken teeth.
2. Establishment and maintenance of an airway.
3. Hemostasis for maintenance of the airway and for prevention of shock from hemorrhage.
4. Débridement of oral wounds.
5. Primary suturing of soft tissue injuries to prevent infection and stop bleeding.
6. Stabilization by temporary splinting and fixation of maxillofacial fractures to relieve pain, to maintain the airway and to control hemorrhage.

■ *Acute General Conditions*

Most oral surgeons appraise the patient's condition prior to surgery. With the usual office facilities, the oral surgeon would not be expected to be qualified to perform a complete physical examination but is presumed to be capable of recognizing obvious risks and to understand the significance underlying disease processes. Elective oral surgery should be postponed in the presence of an acute general condition. A patient with a severe respiratory infection may present himself for surgery merely because he has made the appointment in advance. It is tempting for the surgeon to proceed because of convenience to himself and to the patient. Such temptation should be avoided. If one adheres to the principle of not doing elective surgery in the presence of any acute disease, one cannot go wrong.

■ *Chronic General Conditions*

Most chronic diseases, with their resulting debility, cause the patient to react adversely to surgical intervention. The relative resistive and restorative powers depend on the patient's physical resources as well as on the severity of the disease and the damage it has caused. Most chronic diseases present a surgical hazard, and some preclude all major surgery.

DISEASES OF THE BLOOD—The patients with diseases of the blood are consistently the greatest risk to the oral surgeon. An anemic person may experience a dangerous drop in the red cell count or hemoglobin when loss of blood follows the removal of teeth, even though the amount of blood lost would be considered normal for the average person. One must be painstaking in the prevention and control of hemorrhage. Recent advances in the technic of hemostasis have helped this phase considerably.

Pernicious or Primary Anemia—The modern treatment of pernicious anemia has reversed its role of importance with the so-called secondary anemias, so that well controlled pernicious anemia today presents no problem. There are, however, two types of cases of pernicious anemia that could cause the oral surgeon great concern. In the first type the disease is just developing; it may take up to a year and a half between the onset of symptoms and the establishment of a diagnosis. In

the second type, because of proper diagnosis, treatment and control, the patient feels so well that he may believe he could not possibly have had such a serious disease. Disregarding the physician's warning, he discards treatment with the result that all the original symptoms recur along with the typical blood picture. Any operative procedure during either phase, might well produce the fully developed disease.

Other Anemias—The term "secondary anemia" has been practically discarded by hematologists in favor of a classification based on the morphology and hemoglobin content of the erythrocytes. In all anemias the symptoms are the same, but they may vary in degree. They include pallor, dyspnea on exertion, drowsiness and even edema of the extremities in the severe cases. The lesser symptoms may be circulatory, nervous or gastrointestinal in character. In pernicious anemia, the tongue is smooth, beefy red and sore. In all anemias, there will be noticed a pallor of the lips, oral mucosa and nail beds.

The Leukemias—The cause of leukemia is unknown, but the disease is always fatal, and even the simple removal of a tooth can hasten death. The healing processes seem to be impaired, and even slight trauma often produces massive ulcerations and uncontrollable bleeding.

The oral symptoms of acute leukemia are usually so pronounced that the appearance of the mouth itself causes suspicion of the disease. The gums are spongy, highly inflamed and swollen. The mucous membranes may be ulcerated, and these extremely painful lesions may be the first symptoms of the disease. The chronic forms of the leukemias may more closely resemble anemias and have similar symptoms.

Hemophilia—This disease is mentioned because in the presence of this condition the coagulation time is so high that the slightest injury will cause prolonged bleeding which may not respond to any method of treatment or control. The diagnosis is made at birth, since it is a congenital disease and is a sex-linked character transmitted through the mother to sons only. Hemorrhagic manifestations are apparent early in life and those who live through this period are aware of the dangers associated with the condition. Although statistics show an increased incidence of hemophilia in the United States, it is rarely seen in the office practice of oral surgery, for all patients requiring surgery must necessarily be hospitalized.

Purpura—Purpura is a disease characterized by formation of areas of ecchymosis in the skin and mucous membranes. There are many types of the disease, which fall under two general classifications: (1) thrombocytopenic purpura, in which there is a pronounced decrease in the number of circulating blood platelets, and (2) nonthrombocytopenic purpura, which usually presents no recognizable blood pathology. Essentially, the symptoms of both classes are similar with regard to the tendency toward hemorrhage and the appearance of petechiae in the skin, conjunctiva, mouth and retina.

Comment—The other types of diseases of the blood will not be discussed here, but it can be stated that, in general, any patient with blood dyscrasia must be appraised as a poor risk. It is the duty of the oral surgeon to recognize the manifestations, and particularly the oral signs of

diseases of the blood, for he is often the first one to see the patient.

As routine office procedure, blood examinations should be ordered when any of the following oral conditions are observed:

1. Spontaneous bleeding from gums or mucous membranes, or the presence of petechiae.
2. Postoperative hemorrhages that cannot be controlled by the usual procedures.
3. Pallor of the mucous membranes.
4. Sore tongue not caused by local irritative causes.
5. History of prolonged bleeding in the past.
6. Ulcerations associated with severe illness or not responding to local treatment.

Besides the erythrocyte count, hemoglobin determination and a differential white cell count, the laboratory findings should include bleeding time, clotting time, platelet count and prothrombin determination.

TREATMENT IN THE PRESENCE OF DISEASES OF THE BLOOD—Oral treatment should be, whenever possible, limited strictly to palliative measures until the general conditions are improved by medical measures. Unfortunately, in the blood dyscrasias and particularly in the leukemias, the patient responds poorly when infection is present, so that definitive action may become mandatory. It must be emphasized that even for minor oral surgery, nearly all of these patients must be hospitalized in anticipation of preoperative and postoperative blood transfusions. The collaboration of the physician and the oral surgeon is obviously necessary in every case of this type.

DISEASES OF THE HEART—The usual patient with cardiac disease is keenly aware of his condition and voluntarily gives his history. Practically all cardiac patients will have been previously treated until compensated, and they withstand surgery fairly well.

Occasionally the oral surgeon encounters patients in severe decompensation. Signs of breathlessness, edema of the ankles and cyanosis of the lips and fingernails warn of impending danger, and the oral surgeon should refuse treatment until the approval of a competent physician is obtained. Angina pectoris and previous attacks of coronary thrombosis are less obvious but will be revealed in the patient's history. Here, too, the patient's physician should be consulted.

It is my belief that most patients with cardiac disease including rheumatic, syphilitic, hypertensive, arteriosclerotic and the less common types such as bacterial endocarditis and congenital heart disease will withstand minor oral surgical operation without risk of further damage. The problem, in my opinion, is to determine how much surgery is to be undertaken at one time. This is especially important in the rheumatic and endocarditic patient. For the other types, the risk is encountered in the faulty selection and administration of the anesthetic.

OTHER CHRONIC DISEASES—As a general principle, the presence of a chronic disease does not contraindicate oral

surgery. It admittedly increases the risk and places a greater responsibility on the operator. Such diseases as tuberculosis, bronchiolectasis, undulant fever, Bright's disease and multiple sclerosis undermine the general health of the patient and increase the anesthetic risk. As a general rule, such a patient may undergo extensive oral surgery in the hands of a capable operator and anesthesiologist.

If the patient is diabetic, it is mandatory the diabetes be controlled prior to surgery when conditions permit. Sometimes it is necessary to treat oral conditions, such as acute infections, before control is possible. In these cases, the oral surgeon should work in the closest harmony with the physician.

Old age, *per se*, is not a contraindication for surgical procedures, although, as a general rule, body nutrition and healing powers are less than in a younger patient. In these cases the question must be, "Is surgery necessary?" It must be kept in mind that older patients, even though they may present no problem on the operating table, do not have the vitality and recuperative powers necessary for repair. Often it takes weeks for a very old person to recover from a surgical procedure.

■ *Anesthesia as a Calculated Risk*

In recent years, the number of oral surgeons who employ general anesthesia in their offices has greatly increased. In my opinion this has enhanced the services they render patients; however, there can be no doubt that the burden of responsibilities has been increased. Improper choice of an anesthetic or a faulty administration can well result in fatality.

Local anesthesia is not without danger, although one is prone to forget this when choosing between local and general anesthesia. Even a small amount of the drugs used can produce a rapid fall in the blood pressure, increased pulse rate and syncope.

At the time of this writing, an insurance broker informs me that, in the first seven months of this year, there have been six deaths in dental offices in my population area. The cause of death was claimed to be the administration of a local anesthetic in two instances, nitrous oxide and oxygen in two more and thiopental sodium in the remaining two.

The majority of patients prefer to be unconscious during oral surgical procedures and thus avoid psychic trauma. Provided the patient's circulatory and excretory systems are functioning well, any patient may be subjected to general anesthesia. It is the anesthetist's responsibility to see that an adequate airway is present and maintained and that overdosage of the drug does not occur. The oral surgeon will minimize risk to the patient if he bears in mind that an anesthetic should never be pushed beyond its physiological and pharmacological limitations.

I have found thiopental sodium to be the anesthetic of choice for oral surgical procedures. It is felt that the risk can be made negligible because the drug is adaptable to almost all types of patients, with the exception of the very young. It can be utilized for basal anesthesia, or as a component in balanced anesthesia, and in short operations, as the only agent. It is influenced favorably by premedication

which is usually required by anesthetic-resistant patients such as the drug addict, the alcoholic or the athletic type. Among other favorable considerations, it can be administered so that the patient passes imperceptibly through the first and second stages of anesthesia. In addition, a light surgical stage of anesthesia can be maintained but still with sufficient relaxation for minor procedures. The recovery time is of short duration. Oxygen can be supplied beyond normal requirements even when supplemented with nitrous oxide. This is especially important for patients with anemia, cardiac ailments, kidney and liver diseases, or other debilitating conditions.

Of course, the other anesthetic agents can be made safer by premedication. The use of bartiturates particularly will prevent many reactions associated with the use of procaine, and their depressive effect will complement the induction and maintenance of nitrous oxide anesthesia.

In addition to nitrous oxide and thiopental sodium, which are the more commonly used general agents, di-vinyl ether and ethyl chloride are employed by some oral surgeons with excellent results and surprisingly few unpleasant reactions. The anesthetist's familiarity with a drug and its skillful administration are as important as the agent used.

There are certain qualifying remarks to be made concerning the safety of anesthetics. It must be remembered that a drug that can prŏduce anesthesia is a poison, even though its action is controllable and reversible. Besides the pathologic conditions, a patient must be appraised as to age, physical status and demeanor, all of which influence the dosage and choice of anesthetic agents. Patients who are susceptible and easy to anesthetize can be easily overdosed, even though relatively small amounts of the agent are used. In the opposite type, those who are anesthetic-resistant, such large doses may be required that acute respiratory depression can rapidly follow the state of anesthesia.

Anyone presenting an unusual anesthetic risk should be hospitalized and the services of a qualified anesthesiologist should be obtained. Likewise, any oral surgical procedure that requires more than the usual amount of muscular relaxation should be performed in the hospital with the use of endotracheal intubation, so that a greater depth of anesthesia can be safely maintained.

■ *Importance of Consultation*

The practice of consultation is more widespread among physicians than among dentists. Physicians, perhaps, recognize and realize more fully than dentists do, the importance of another respected opinion, as well as the desirability of having another man help carry the load and assume some of the responsibility. Some consultations are for the purpose of obtaining information; others are merely for the purpose of sharing responsibility. Almost all dentists have frequently felt the need for both.

Patients are sometimes timid in requesting a consultation, but the oral surgeon should never deny such a request once it is made. One should make use of both medical and dental consultants. There are instances when a proper appraisal of the patient is impossible without their aid.

■ *Appraisal of the Office Patient*

It would be unusual for a busy practitioner to take a classical history and make a detailed study of the average patient from a medical and laboratory standpoint. At the same time, one should disregard the often quoted contention that "anyone well enough to walk into the office is a good risk."

The most important appraisal of the office patient must be based on his history. It is felt that a brief printed questionnaire, checked and signed by the patient, is the most satisfactory method of obtaining information. It should include questions as to the present health status, whether the patient is under a physician's care, allergic reactions and drug sensitivity, experiences in previous extractions, especially with respect to bleeding and anesthesia.

This type of questionnaire is so phrased that the person who is a good surgical risk will answer the questions favorably, and no further history is requested. Obviously, when the answers are unfavorable, a more comprehensive history is taken, the patient's physician may be consulted, or laboratory tests may be requested.

In the offices where general anesthesia is used, it is important that blood pressure and pulse rate be recorded routinely for all adult patients.

■ *Summary*

In each case preparatory to oral surgery, it is necessary for the operator to be cognizant of the degree of risk involved.

Acute injuries are discussed, with special emphasis on shock, hemorrhage and other concomitant body injuries. The objectives of emergency maxillofacial care are enumerated.

Patients with chronic disease, some of which are discussed, must be evaluated from the viewpoint of both surgery and anesthesia.

The acutely ill patient should at all times be rejected for elective surgery. Nearly all chronically diseased patients can, with proper medical care and a careful anesthesia, be considered good risks for elective oral surgical procedures.

Consultation is considered so important that it is mandatory whenever a risk seems great.

With careful appraisal, not only untoward reactions, but even a life itself, may be saved.—*1518 North Broadway.*

Tuberculosis of the gingiva:
report of case

■ *Karl W. Bruce, D.D.S., M.S., Rochester, Minn.*

Oral tuberculosis probably is not as commonly observed today in a general dental practice as it has been in the past because of the prevailing measures taken to detect and treat tuberculosis in its early stages. The amount of attention given to oral tuberculosis in the literature, however, lends support to the assumption that tuberculosis must be considered in the differential diagnosis of oral lesions.

Darlington and Salman[1] described oral tuberculous lesions as occurring at the tooth apex and also on the oral mūcoūs membranes. They described those in bone as tuberculous periostitis, osteitis and osteomyelitis. Zilz[2] has reported a histologically recognizable tuberculous lesion in the dental pulp.

Oral tuberculosis is generally thought to result from secondary spread from a primary focus most frequently situated in the lungs. The oral lesion is initiated by infected sputum or endogenous spread via the blood stream. Primary tuberculosis of the gingiva has been reported by Cameron,[3] Dobberstein,[4] Bernstein,[5] Collins and Cook,[6] Martin,[7] Ehrhardt,[8] and Duken.[9] Rubin[10] asserted that there is no primary tuberculosis of the mouth. Hotz,[11] on the other hand, expressed the belief that primary infection of the mouth is much more frequent than formerly believed. Burket[12] stated that the incidence of oral tuberculosis has been reported to vary from 0.35 to 3.65 per cent in all types of tuberculous infection.

Brodsky[13] and Katz,[14] who reported on both gross and microscopic findings at necropsy in cases of tuberculosis, quoted a considerably higher incidence of oral tuberculosis. Brodsky reported 28 cases of oral tuberculosis in 141 consecutive necropsies in cases of tuberculosis. Katz reported on postmortem findings in 200 consecutive cases of tuberculosis; he found an incidence of 19.9 per cent of oral tuberculosis in this study. The variation in the reported incidence of oral tuberculosis may indicate that

From the Section of Dentistry, Mayo Clinic, Rochester, Minn.

1. Darlington, C. C., and Salman, I., Oral Tuberculous Lesions. *Am. Rev. Tuberc.* **35**:147 (Feb.) 1937.

2. Appleton, J. L. T., *Bacterial Infection with Special Reference to Dental Practice*, ed. 3. Philadelphia: Lea & Febiger, 1944, p. 462.

3. Cameron, C., Tuberculosis of Mouth, a review, with Report of Case of Chronic Military Tuberculosis Complicated by the Condition. *Brit. J. Tuberc.* **33**:157 (July) 1939.

4. Appleton, J. L. T., *Bacterial Infection with Special Reference to Dental Practice*, ed. 3. Philadelphia: Lea & Febiger, 1944, p. 463.

5. Bernstein, B., Primary Tuberculosis of the Buccal Mucosa. (Abst.) *Internat. J. Orthodontia* **7**:103 (Feb.) 1921.

6. Collins, L. H., Jr., and Cook, T. J., Oral Tuberculosis as Initial Manifestations of Rapidly Progressing Fatal Tuberculosis. *J.A.D.A.* **27**:1608 (Oct.) 1940.

7. Martin, W. F., Primary Tuberculosis of the Tongue. *South. Med. & Surg.* **99**:348 (July) 1937.

8. Appleton, J. L. T., *Bacterial Infection with Special Reference to Dental Practice*, ed. 3. Philadelphia: Lea & Febiger, 1944, p. 463.

9. Duken, J., Primary Tuberculous Lesion of the Upper Lip of Two Year Old Child. (Abst.) *J.A.M.A.* **91**:996 (Sept. 29) 1928.

10. Rubin, E. H., Tuberculosis of Buccal Mucous Membrane. *Am. Rev. Tuberc.* **16**:39 (July) 1927.

11. Hotz, R., Tuberkulose im Bereiche der Mundhohle und der Kiefer. *Schweiz. Monatschr. f. Zahnh.* **59**:712, 1949.

12. Burket, L. W., *Oral Medicine: Diagnosis, Treatment*. Philadelphia: J. B. Lippincott Co., 1946, p. 493.

13. Brodsky, R. H., Oral Tuberculous Lesions. *Am. J. Orthodont. (Oral Surg. Sec.)* **28**:132 (Feb.) 1942.

14. Katz, H. L., Tuberculosis of Tongue. *Quart. Bull., Sea View Hosp.* **6**:239 (April) 1941.

oral tuberculosis is not being diagnosed at the time of clinical examination in all cases or that oral lesions are more prominent in the terminal phases of the disease.

Shengold and Sheingold[15] reported that the ratio of men to women having oral tuberculosis averaged about 5:1 throughout the literature. They stated, too, that the highest incidence of oral tuberculosis in the male occurs during the third or fourth decade of life.

REPORT OF CASE—The patient, a white man 46 years of age, presented himself at the Section of Dentistry of the Mayo Clinic on July 2, 1951, with a tentative diagnosis of tuberculosis of the gingiva. He had registered at the clinic for medical examination once prior to his present admission. At that time, August 5, 1945, he had just been dismissed from a tuberculosis sanatorium, where he had been hospitalized for seven months. The diagnosis on his first admission at the clinic was latent pulmonary tuberculosis.

Four weeks prior to appearing at the clinic on July 2, 1951, the patient became conscious of hemorrhage issuing from the lower left bicuspid area. This area was painful. An oral surgeon in his home locality was immediately consulted. He observed an unusual type of tissue situated on the buccal gingiva adjacent to the lower left bicuspid teeth, which were exceedingly mobile. These teeth and a specimen of the atypical tissue were removed. The pathologist's diagnosis was chronic caseating granuloma, presumably tuberculosis, and the patient was referred to the clinic.

At the time of the oral examination at the clinic a lesion, measuring 4 by 5 cm., located on the alveolar gingiva but invading the buccal sulcus was found. This lesion extended on the left side of the mandible from the cuspid to the first molar region. The surface of the lesion was overlaid with pebbly granulation tissue, and in the central portion a slough was covered with a grayish yellow exudate. The border of the ulcer was irregular and undermined, presenting a moth-eaten appearance. The lesion was exceedingly painful. Two submaxillary lymph nodes on the left were enlarged and tender (Fig. 1). A dental roentgenogram revealed no particular osteolytic changes in the subjacent bone (Fig. 2), but there was evidence that recent extractions had been performed.

Fig. 1.—Appearance of lesion in the left side of the mandible. Pebbly granulation tissue and central slough may be noted. The border of the ulcer is irregular and undermined

After the oral examination, the patient was sent elsewhere in the clinic for medical evaluation. The result of a single strength tuberculin test was strongly positive for tuberculosis at the end of 48 hours. The sputum was negative for acid-fast organisms, but cultures of the sputum were positive for acid-fast bacilli. The roentgenogram of the thorax (Fig. 3) demonstrated infiltration of both upper lobes of the lungs, and the roentgenologic diagnosis was tuberculosis, probably active.

Biopsy of the oral lesion was not performed because of the pain associated with the procedure, but the tissue which had been taken earlier from the oral lesion was submitted by the pathologist in the patient's home town. Some sections of tissue were stained with hematoxylin and eosin, and others were stained for acid-fast organisms according to the Ziehl-Neelsen method. The sections stained with hematoxylin and eosin demonstrated a chronic inflammatory granulomatous type of inflammation with well-formed tubercles present (Fig. 4). Caseous necrosis was noted throughout the

15. Shengold, M. A., and Sheingold, H., Oral Tuberculosis, *Oral Surg., Oral Med. & Oral Path.* 4:239 (Feb.) 1951.

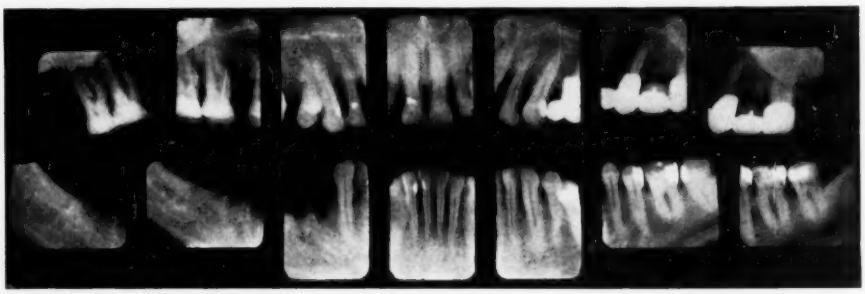

Fig. 2.—Intraoral dental roentgenograms which reveal no osteolytic change subjacent to the lesion situated on the buccal gingiva in the lower left bicuspid region. The sockets of recently extracted teeth can be noted

section. The stroma outside the tubercles and necrotic areas was vascular, and there was some evidence of perivascular lymphocytic cuffing. The surface epithelium was ulcerated, but in areas where the epithelium remained intact it was hyperplastic, with elongation of the rete. Sections of tissue stained for organisms showed a few acid-fast bacilli (Fig. 5). Guinea pig

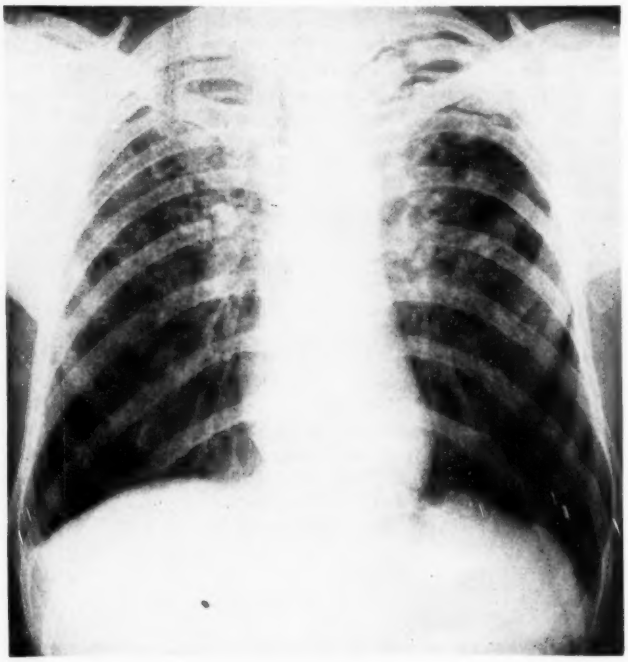

Fig. 3. – Roentgenogram of the chest showing evidence of bilateral pulmonary tuberculosis with involvement chiefly of upper lobes

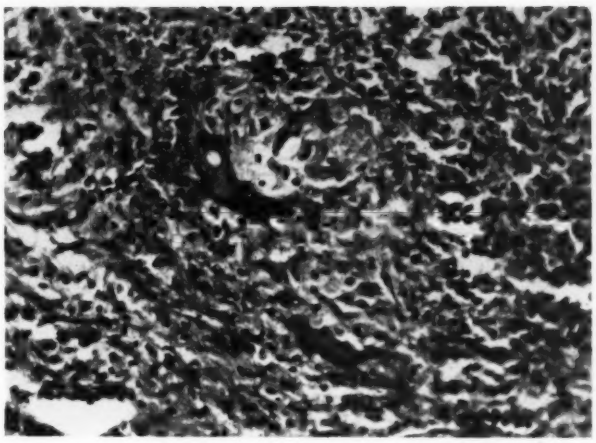

Fig. 4.—Tubercle formation, compact foci of epithelioid cells with Langhan's type of giant cells and a poorly defined zone of lymphocytes around the tubercle (hematoxylin and eosin, × 275)

inoculation was not carried out, as no tissue was removed at the clinic from the oral tuberculous ulcer.

It was agreed from all the data accumulated that the patient had active pulmonary tuberculosis and a secondary tuberculous lesion of the oral cavity. It was also held that the patient should enter a sanatorium for treatment of tuberculosis. No local treatment for the oral lesion was prescribed, but it was assumed that it would probably respond favorably to the antibiotic therapy and supportive measures that would be utilized in the treatment of the active disease. The case was reported to the health officer in the patient's home locality.

COMMENT—In general, opinions favor the impression that oral tuberculosis is not commonly observed in a general clinical practice. Its seemingly infrequent appearance in the presence of open active pulmonary tuberculosis suggests that the oral habitat possesses local protective factors against tuberculous infection even though the sputum of these patients is laden with tubercle bacilli. At first appraisal the stratified squamous epithelium of the mouth may seem to afford the necessary protection to prevent invasion of the organisms, but on further analysis it must be admitted that the oral mucous membrane is seldom without interruption in the form of traumatic ulcers and abrasions. The free margin of the gingiva and third molar flaps also seem to offer suitable environment for the organisms to flourish and to invade submucosal tissues.

Kanter and Appleton[16] stated that saliva exerts a bacteriostatic effect on tubercle bacilli. Shengold and Sheingold have concluded that the rarity of oral tuberculosis in the face of a positive sputum has some relationship to the lack of lymphatic tissue in the mouth, which they infer is a type of tissue particularly susceptible to inoculation with tuberculosis.

The majority of investigators favor the opinion that tuberculosis of the oral mucous membranes appears in association with far-advanced pulmonary tuberculosis and that its inception is the result of secondary spread from the pulmonary disease. The initiation of the lesion may result from autoinoculation of some pre-existing nontuberculous lesion, such as a periodontal pocket or a break in the continuity of the oral epithelium, when tubercle bacilli are present in the sputum. This is the so-called

16. Kanter, F., and Appleton, J. L. T., Antibacterial Effect of Saliva on Tubercle Bacilli. (Abst.) *J. D. Res.* 19:279 (June) 1940.

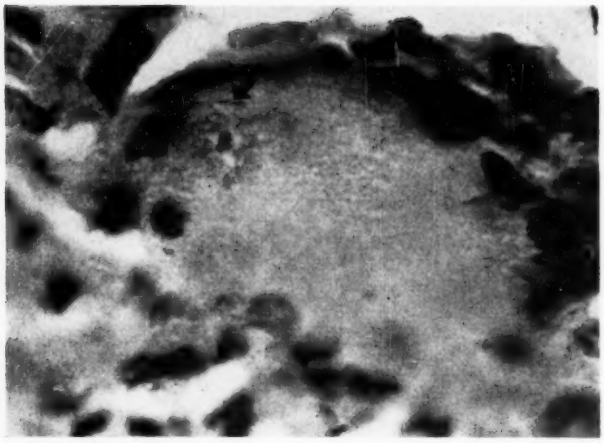

Fig. 5.—The beaded, slender, rod-shaped organism situated within a giant cell of Langhan's type should be noted. (Section stained for acid-fast organisms according to the method of Ziehl and Neelsen. × 1,470)

exogenous route. The fact that the oral tuberculous lesion usually appears at the site of some pre-existing nonspecific lesion does not exclude the hematogenous or endogenous route, however, as blood bacteria tend to be localized in inflamed tissue.

In some instances so-called primary oral tuberculosis is in reality secondary to an extraoral latent or subclinical tuberculous focus. Ivy and Appleton[17] have observed that the extraction of teeth is a factor in the inception of a tuberculous infection in that region.

It might have been assumed in the present instance, after a casual survey, that the extraction of the two mobile bicuspid teeth was a factor in the development of the tuberculous lesion situated on the alveolar ridge, had there not been warranted evidence that a tuberculous process was progressing in juxtaposition to the two mobile periodontally diseased teeth and antedated their removal. The infection probably was inaugurated in a periodontal pocket associated with the teeth, and the lesion, not the teeth, was causing the symptoms.

In some instances the diagnosis of oral tuberculosis by the dentist and oral pathologist may lead to the initial diagnosis of a more generalized form of the disease, specifically tuberculosis of the lungs. Oral tuberculosis, however, usually occurs with far advanced generalized tuberculosis, and the oral lesions do not occur early enough in the disease to enable the dentist to be of much assistance to the internist in making an early diagnosis of the condition.

17. Ivy, R. H., and Appleton, J. L., Jr., Diagnostic Importance of Tuberculous Lesions of Oral Cavity, *J.A.M.A.* 81: 1483 (Nov. 3) 1923.

Cavernous sinus thrombosis following extraction of tooth: *report of case*

■ *Ronald Grant, D.D.S., M.S., Dearborn, Mich.*

Metastasis of bacteria to the cavernous sinus via the venous route is most generally seen following abscesses of the teeth of the anterior maxilla. Here the route is via the lateral nasal, angular and small accessory vein which joins the angular vein to the opthalmic vein. The following case demonstrates the possibility of ascending infection from the posterior maxillary region via a small emissary vein connecting the pterygoid plexus with the inferior ophthalmic vein which joins the superior ophthalmic vein before entering the cavernous sinus.

HISTORY—A 27 year old man was admitted to the Veterans Administration Hospital, Dearborn, Mich., on June 6, 1949, with severe edema and exophthalmos of the right eye. Ten days previous to admission he had had severe pain and discomfort in the region of the right maxillary second molar. Two days later he was examined by his family dentist, who advised against removal of the tooth because of acute swelling and elevation of the mucoperiosteum in the region of the offending tooth. His dentist prescribed sulfadiazine and home care. The patient was not satisfied with this and sought the services of another dentist who employed regional anesthesia but was unsuccessful in his attempt to remove the tooth. He referred the patient to a neighboring dentist for the completion of the procedure under gas anesthesia. The patient stated that on the third day after removal of the tooth, he became

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Fig. 1—Left: Exophthalmic appearance of the right eye on admission. Right: Roentgenogram showing cloudiness of the right maxillary sinus

Fig. 2.—Left: The patient eight days after treatment. Right: The patient two weeks after treatment

somewhat drowsy and had severe headaches and weakness and swelling of the lids of the right eye. The condition became progressively worse. His family physician prescribed penicillin and sulfadiazine and advised hospitalization.

EXAMINATION—The patient was a well developed, well nourished white man who appeared acutely ill. Temperature was 103.6° F. and the patient was lethargic and slow to respond to interrogation. Extraocular movements of the left eye were normal; those of the right eye appeared to be present but greatly restricted by edema of the lid and conjunctiva. He was unable to open the right eye. There was pronounced ecchymosis of both lids, and exophthalmos was present (Fig. 1, left). Results of the oral examination were essentially negative, there was no evidence of edema at the site of recent tooth extraction.

The urine was normal. The white blood cell count was 27,950 and the hemoglobin 13.5 Gm. Blood cultures taken on the day of admission showed no growth.

Roentgenographic examination of the paranasal sinuses revealed extreme cloudiness of the right maxillary sinus (Fig. 1, right).

DIAGNOSIS AND TREATMENT—The diagnosis was cavernous sinus thrombosis following tooth extraction. Treatment with massive doses of penicillin was initiated on the day of admission, 200,000 units every three hours. Heparin, 25 mg., was given every two hours, along with therapeutic doses of sulfadiazine.

HOSPITAL COURSE—A short time after the patient's admission diplopia developed with a divergent squint of about 15 degrees in the right eye. Rapid improvement was noted almost immediately after admission. Edema and discoloration of the right lids and exophthalmos of the right eye rapidly subsided and by the eighth day of hospitalization had almost completely subsided (Fig. 2, left). The patient continued to improve, and on January 20 he was discharged. At that time there were no residuals and only slight edema of the upper right lid (Fig. 2, right).

COMMENT—The removal of acutely infected teeth of the maxilla should be postponed until the acute symptoms have been controlled by chemotherapy or, if necessary, incision and drainage.

Transplantation of a viable and incompletely formed third molar: *report of case*

■ *Harry T. McMahon, D.D.S., White Plains, N. Y.*

The many forms of plantation of teeth, and the various procedures employed in these operations, date back centuries, and have been reported extensively in dental literature. However, the transplantation of a partly formed viable third molar at the same time as the extraction of a first or second molar which it is to replace, is a comparatively recent concept and achievement. The possibilities of this procedure have been demonstrated by others.[1]

REPORT OF CASE—A 17 year old girl called at my office on May 7, 1948, for the removal of the lower left first and second molars. Roentgenograms showed that these two teeth were carious, and broken down beyond salvage. The roentgenograms also showed an unerupted partly formed third molar (illustration).

In order to avoid a lingual bar restoration a transplantation of the partly formed third molar into the socket of the removed first molar was decided on.

OPERATION—Block and infiltration anesthesia were administered. An incision was carried from the anterior border of the ascending ramus to the distal side of the first bicuspid. The gingival margins of the involved teeth were detached by incision, and the buccal mucoperiosteum was displaced, providing clear visualization of the field of operation. The third molar was lifted from its crypt with an elevator, care being taken not to traumatize any part of the tooth. Injury to the incompletely formed roots was especially avoided. The tooth was next placed in isotonic sodium chloride solution to prevent drying. The second and first molars were removed next.

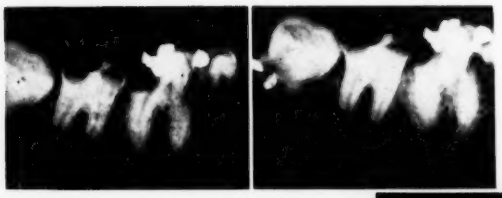
The socket of the first molar was prepared for the reception of the transplant by excision of the dividing bony septum. The socket was further enlarged lingually and buccally, with cross-cut fissure burs, so as to freely accommodate the transplanted tooth. The crown of the tooth was freed from the remains of the follicle and was placed at such a level that it occluded with the upper molar. The mucoperiosteal flap was restored next and secured with several sutures to the distal side of the implanted tooth. The tooth was ligated to the first and second bicuspids with a figure 8 floss silk ligature. This immobilization was reinforced with surgical cement packed to the buccal and lingual sides of the implanted molar and the bicuspids, leaving the occlusal surfaces free.

POSTOPERATIVE CARE—The patient was instructed to avoid chewing on the affected side for at least three weeks and to subsist mainly on soft food. Ice bags were applied to the jaw for the first four days. Penicillin was administered for 10 successive days.

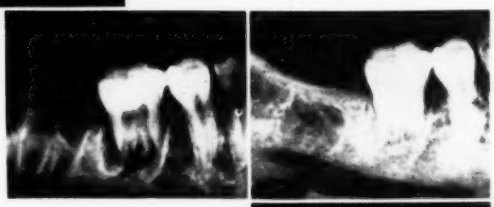
When the patient was seen two days later, there was no pain and very little, if any, swelling. The cement was removed and was replaced at this sitting. The gums appeared to be pink and healthy. The second application of cement was removed three days later; the floss silk ligature, however, was permitted to remain in place for 10 days.

Successive roentgenograms were taken during the first seven months after the operation (illustration). These showed progressive growth of the roots of the transplanted molar. The last one taken was on January 10, 1952, nearly four years later. It showed that the

1. Apfel, Harland. Autoplasty of enucleated prefunctional third molars. J. Oral Surg. 8:289 (Oct.) 1950.



Serial roentgenograms of a transplanted partly formed third molar into the socket of the first permanent molar. Left: The original condition



Left: Six days after the operation. Right: Seven months after the operation, showing progressive growth of roots

About four years later. The roots are fully formed and to all appearances have normal structural attachments

roots developed completely and were lodged normally in their environment. My own testing and the reports obtained showed that the tooth reacted in all respects as would a normally vital tooth.

COMMENT—Several other such operations have been done by me since. It is too early to state what possibilities similar viable transplantations may lead to. It may reasonably be expected, however, that, with further biologic and physiological research, experimentation and technical experience, the transplantation of viable incompletely formed teeth will prove to be a boon in many instances.—*108 Grand Street.*

■ Antibiotic Age

It is little more than a decade since the first patients were successfully treated with penicillin. In that decade what amounts to a revolution in medicine has taken place; we have entered an "antibiotic age." To penicillin there have been added four other antibiotic drugs of major importance. Some of the most deadly infections of mankind have been mastered, and countless lives saved. From the new drugs have come new methods of animal feeding that produce more meat at lower cost. The antibiotics have become a multimillion-dollar industry.—*Kenneth B. Raper, "The Progress of Antibiotics," Scientific American 186:49 (April) 1952.*

Oral surgery coverage under Blue Shield in Massachusetts

BLUE SHIELD in Massachusetts has operated for eighteen months on a plan in which dentists have participated and in which hospitalized patients have undergone oral surgical operations covered by the terms of their contracts. Although the American Dental Association has not as yet formulated an opinion on the matter, many state dental societies are eager to have dentistry and oral operations included in their state Blue Shield contract. Hence, the experience of Massachusetts dentists in this regard furnishes important considerations for other state societies attempting to bring about a similar arrangement.

As regards the cost of including dental services, oral surgery coverage in Massachusetts was added to existing policies without an increase of premium. At present, Blue Shield is well able, actuarially, to absorb the cost of the additional benefits. Oral surgical claims have constituted approximately one per cent of total services at a cost of only one and one half per cent of the total payments made by Blue Shield.

Many oral surgeons believe that only cases requiring major oral surgery should come under Blue Shield. In Massachusetts, from January to June, 1951, Blue Shield paid a total of 482 claims for oral surgery services. Of these 401, or 84 per cent, were no more complicated than extractions and odontectomies. Obviously, oral surgical coverage would be of slight benefit to policy holders if extraction of teeth were not included. Multiple extractions, the preparation of the ridges for dentures, alveoloplasty, root resection and excision of impacted teeth are very much a part of the oral surgeon's field of activity, as well as of the dentist's.

The Massachusetts plan pays only for services rendered to hospital inpatients. Some critics have pointed to this limitation as a shortcoming since in general surgical procedures

Blue Shield coverage extends to office practice. However, at present to pay for dental work done in the office would appreciably increase the Blue Shield premium. Time and actuarial experience might make it possible to extend the coverage. At present operations serious enough or extensive enough to burden the patient financially, justify hospitalization. Such procedures as the extraction of twenty teeth and alveoloplasty of both ridges, for example, warrant performance in a hospital and consequently could be covered by the Blue Shield policy.

The Massachusetts plan required special legislation to enable the Blue Shield to include dentists and dental operations under its coverage; and special action would be necessary in most states since the law has established Blue Shield for the participation of physicians only. To extend the coverage by law, it would doubtless be necessary to include the general practitioner in dentistry as well as the qualified oral surgeon. Otherwise, without the support and prestige of the whole dental profession, the chances of success with the legislature would be small.

A program directed toward accomplishing the expansion of the Blue Shield plan in any state would include the following steps:

1. Have the state dental society appoint a Blue Shield committee consisting of all or at least a majority of oral surgeons.

2. Where necessary, work with the cooperation of Blue Shield for the passage of an enabling act by the state legislature.

3. As a beginning, confine coverage to hospital dental cases.

4. Include the extraction of teeth and associated procedures under the plan of coverage.

5. Establish reasonable fees for low income patients.—*Walter G. Guralnick.*

■ AN INTRODUCTION TO MODERN PSYCHOLOGY. O. L. Zangwill. 227 pages. Price $3.75. New York: Philosophical Library, Inc., 1950.

This book provides "an outline of modern psychology as envisaged from the biological standpoint." It is concerned only with those aspects of psychology which may be studied by methods of empirical science. The entire book is devoted to this aspect of psychology. The nine chapters are entitled: "The Background of Modern Psychology: A Survey of Experimental Psychology"; "Sensory Processes"; "A Survey of Experimental Psychology: Learning and Intellect"; Modern Physiological Psychology: Brain and Mind"; "Modern Physiological Psychology: Appetite, Instinct, and Emotion"; "Intelligence and Mental Measurement"; "Psycho-Analysis and General Psychology"; "Problems of Personality" and "Psychology and the Future."

These chapters have subdivisions which are interesting. Chapter 7 which discusses psychoanalysis deals with dreams and the unconscious, infantile sexuality, Freud's views on mental structure, aggression, anxiety and guilt. This book is readable.—*Harry Strusser.*

■ APHORISMS OF CHARLES H. MAYO AND WILLIAM J. MAYO. Collected by Frederick A. Willius, M.D., First edition. 109 pages with two illustrations. No index. Price $2.75. Springfield, Ill.: Charles C Thomas, 1951.

This is a collection of 215 pithy sayings and aphorisms from the complete writings of the Doctors Charles H. Mayo and William J. Mayo of the Mayo Clinic, Rochester, Minnesota.

As stated in the introduction, it seemed desirable to record these "pearls of wisdom" in a small volume, readily accessible to those who did not know the Mayo brothers, and to the generation of physicians to come. These medical maxims are divided into two groups, each group being supplemented with excellent references.

Exclusive in the book is the so-called "Lost Oration" by Dr. William J. Mayo before a committee of the Minnesota State Legislature, on March 22, 1917. These extemporaneous remarks, set down by newspaper reporters present, are a powerful and eloquent expression of the ideals of the Mayo brothers.

Dr. Willius is to be congratulated on this monograph. The publisher is also to be complimented for producing an inexpensive book that contains legible type and sturdy paper. The book is well worth reading, as a rich source of inspiration.—*E. Alan Lieban.*

■ TRANSACTIONS OF THE CONFERENCE ON MORALE—AND THE PREVENTION AND CONTROL OF PANIC. Conference held under joint auspices of New York Academy of Medicine and the Josiah Macy, Jr. Foundation. 75 pages. New York City.

This conference was directed toward the understanding of the problems of individual and mass anxiety, fear and panic. It was specifically concerned with the situation which might arise if war, especially atomic warfare, came to this continent and affected the American people directly. The participants in this conference were well qualified psychiatrists and others, many of whom had personal experience in European wars where they had observed the morale of people under attack.

Building of the morale of people to withstand catastrophe is stressed as the greatest preventive against panic and even as a deterrent to war. Panic arises from frightening experiences

which are outside the bounds of ordinary experience or individual way of life. Some people can adapt themselves to such experiences better than others.

In many mass atomic attacks on a principal city, perhaps not more than three per cent of the population will actually be injured. It is the other 97 per cent that must care for the casualties and clean up the rubble. They must maintain a high level of morale and face the situation with courageous hearts—all for one and one for all.

The chief cause of panic is anxiety over the unknown. Most people can face realities if they are known. Therefore, in any catastrophe the greatest morale builder is publicity and dissemination of authentic information.

There is too little public participation in the Civil Defense program. There is too much apathy which in time of stress will lead to confusion. Adequate civil defense, under strong leadership, will teach the people that they can protect themselves from disaster and will build the strongest public morale.—*R. W. Bunting.*

■ X-Rays in Dentistry. Twelfth edition. 80 pages, with 47 figures. Rochester, N. Y., Eastman Kodak Co., 1951.

This popular manual is now in its twelfth edition. In 20 years well over a quarter of a million copies have been published. It is exceptionally well illustrated from the standpoint of the use of x-rays in the dental office and the reproductions of the individual films is superb. It includes sections on x-ray materials for the dental office, the principles of exposure and safety measures. The anatomical aspects of dental roentgenography are beautifully illustrated and fully documented. The section on roentgenographic technic describes the standard method, for use with an eight inch target skin distance. The illustrations show, side by side, diagrams of head position, photographs of packet placement, photographs of cone placement and diagrams of angulation with illustrative roentgenograms. It is particularly helpful to be able to see each of these illustrated on the same page. The concluding section on processing presents the essential fundamentals and is well illustrated. The twelfth edition of this compact useful book offers a handy manual of dental roentgenographic technic.—*William Ward Wainwright.*

■ Oral Rehabilitation. Jerome M. Schweitzer. First edition. 1,161 pages with 1,157 illustrations. Index. Price $20. St. Louis: C. V. Mosby Co., 1951.

"The main purpose in attempting a text of this nature is to permit and to evaluate, in terms of the lowest common denominator, the different approaches that have already been made by men in the various specialties, especially of medicine and dentistry. . . . I have endeavored to present many theories and many different mechanical techniques which are used in complete occlusal reconstruction. . . . There is no one theory or one method of treatment. All theories and all methods have good and bad in them. We should extract the good and make use of it."

Thus, in part, Dr. Schweitzer introduces one of the most massive and imposing dental textbooks to appear in many years. Of its 41 chapters, 26 are devoted to studies of the temporomandibular joint. The remaining 15 chapters deal with occlusion and its related subjects.

Few books that have appeared in the dental literature have done such a thoroughgoing job of combing the writings and expressions of opinion in such a large field. It is a monumental review of the literature on its subject. Some may object that a great portion of the book has been written with scissors and paste, but this would be most unfair. Such discriminating and searching cutting and such skillful arrangement of material represent in themselves a mountainous labor. Few students of this subject could find, much less study, all the articles, books, opinions and clinical observations that Dr. Schweitzer has compiled in one volume. Anyone who has written even a small textbook will readily appreciate the onerous drudgery involved merely in the physical mechanics of handling such a bulk of writ-

ings and illustrations. That it consumed 20 years could never be doubted.

There is one objection, however, to a book written in such encyclopedic fashion, and that is that it may fall short of being a definitive textbook and become a bewildering mass of opinions and fancies sandwiched between concrete evidence and scientific fact. "In studying this text," to quote again from the introduction, "the reader may sometimes be confused because of what will appear to be contradictions. This author is also confused because clinically these contradictions present themselves daily."

This explanation is entirely acceptable insofar as clinical material is concerned. In presenting scientific material, however, it is unfortunate for an author to give space to conflicting views, only one of which can be correct, and thus convey to the reader the feeling that the conflicting views are of equal weight and value.

Some readers may feel impelled to raise a question as to which investigations are important and what makes them so. Does the mere fact that a certain investigator has written several articles and read several papers before scientific societies make his investigations important? Let us take a concrete example: Much space is devoted, in this book, to the writings of certain men who have purported to show that disturbances of hearing may occur because the eustachian tube is compressed by a distal displacement of the condyle of the mandible. Farther on, several pages are given to quotations from an article by Harry Sicher, among which we find: "A glance at the skull of a wet specimen should suffice to dispel any hope that acoustic disturbances could be explained by a compression and a degeneration of the cartilaginous part of the eustachian tube by the condyle of the mandible. There is not the remotest relation between the cartilaginous tube and the temporomandibular articulation."

When a man of the stature of Dr. Sicher makes such a statement and proves it by demonstration on the cadaver, the reader may ask whether Dr. Schweitzer should not have judged the investigations of the earlier writers as unimportant and omitted them entirely—except, perhaps, merely to mention their existence and inaccuracy.

In the latter portion of the book many diverse theories and mechanical methods are given for restoring disturbed or perverted occlusal function, and with this there can be no quarrel.

The book is smoothly written, logically arranged, beautifully printed, and surprisingly easy to read. The vast number of illustrations show great care and skill in selection and their reproduction is almost uniformly excellent, which is remarkable when one considers the wide variety of sources that have been drawn upon. Credit is given by the author to his two sons, both also dentists, and to his wife for drawing, redrawing, retouching, and airbrushing many of the figures. One cannot refrain from admiring this family cooperation.

Any student or practitioner of oral rehabilitation will find this book a gold mine of useful and practical knowledge and instruction. He may have to "pan" for the gold occasionally, but it is there and well worth the search.—*Warren Willman.*

■ Immediate Care of Catastrophic Head Injuries. Abraham Kaplan. Plast. & Reconstruct. Surg. 8:278, October, 1951.

It must always be remembered that a casualty having a head injury may also have other injuries elsewhere. First, the vital signs must be investigated. It must be determined quickly whether or not the patient is dead or has any chance of survival. The vital signs to be looked for are: first, the state of consciousness. Simple pressure over the stylomastoid area, in a general way, will help to determine the degree of unconsciousness. If the patient is in deep coma, there will be no response. The state of the pupil and the corneal reflexes are helpful in determining the patient's survival status. Dilated fixed pupils, absent corneal reflexes and the soft eyeballs, are poor prognostic signs. The patient's general color and the temperature of the skin and, perhaps, evidence of rigor, will aid further in the determination. The signs of shock seldom are found even in extensive head injuries with brain laceration unless there has been great loss of blood from the scalp or severe injury elsewhere to viscera or bones. Morphine is contraindicated in head injuries for three reasons. It increases coma thereby masking the state of consciousness; it depresses respiration in patients whose respiratory center is already depressed; and it increases intracranial pressure which should be avoided. Patients who are in great pain or are extremely restless should be given an adequate amount of morphine without hesitation.

Hemorrhage from the scalp frequently is alarming in its appearance but, in most instances, can be controlled readily with pressure, particularly against an intact portion of the skull. There may be a great temptation to remove an indriven foreign body from the skull or brain but such an attempt will increase the damage and, in many instances, precipitate profuse and uncontrollable bleeding.

Infection of the scalp, skull and cerebral tissue is not an immediate problem for it takes at least 24 to 36 hours for infection to develop. A generous dose of an intramuscular injection of penicillin will be sufficient to tide over most cases until more definitive surgery can be undertaken.

Flash and fire burns frequently may involve the forehead but the rest of the scalp usually is spared by the hair. It is best to clip the singed hair and then apply a sterile vaseline gauze dressing over those areas of the scalp which are involved in the burn.—*Herbert J. Bloom.*

■ Black Hairy Tongue: Report of a Case Cured with Superficial Roentgen Radiation. D. Truett Gandy. Arch. Dermat. & Syph. 65:97, January, 1952.

Black hairy tongue is a disorder of curious morphology, which, although first described more than a century ago, continues to arouse interest because of its oddity and its disputed origin. This malady may occur anywhere on the dorsum of the tongue; but in a typical example it arises in the triangular area in front of the circumvallate papillae and slopes forward as a dark fusiform mass composed of elongated epithelial filaments with a tendency to branching, giving the superficial impression of a tuft of hairs. Its appearance has been appropriately likened to "the hair of a dog dampened by water" and "a field of corn laid low by the wind." The individual elements of the lesion, which may reach ¾ inch (1.91 cm.) in length, represent hypertrophic filiform papillae; the color may range from black through sepia-brown to yellowish and even greenish hues.

The pigmentation has been ascribed by different authors to various microorganisms and to external sources, such as foods, stimulants, and mouthwashes. Several hypotheses have been postulated in attempts to explain the remarkable overgrowth of the papillae. Histologically, the process is essentially a hyperkeratosis, showing no evidence of inflammatory reaction. The course is capricious. Spontaneous involution may occur followed by recurrence. The filaments are usually tough and difficult to detach by pulling. Certain patients may complain of tickling sensations or slight gagging, but most cases are symptomatic and therefore of no great clinical significance. Introspective persons may develop fancied symptoms, such as a mawkish taste and even pain, once their attention has been directed to the presence of the condition.

The treatment usually recommended is manual removal of the filaments followed by application of mild cauterants, such as 10 per cent salicylic acid in alcohol and trichloroacetic acid. Because of its specific action on epithelial hypertrophies the use of massive-dose vitamin A therapy would seem rational; this has been tried, but the lesion is prone to recur. Success with superficial roentgen ray therapy prompts the following report: The lesion was treated with 300 r of unfiltered superficial roentgen rays through a cone with a 1 inch (2.54 cm.) port, the beam being directed at the base of the triangular mass in the circumvallate V. The growth disappeared in 10 days and has not recurred after two years.—*Myron Kaufman.*

■ The Diagnostic Significance of a "Lump in the Neck." Hayes Martin. Postgrad. Med. 11:491, June, 1952.

Among 1,300 consecutive cases of cancer at Memorial Hospital, 163 stated that a "lump in the neck" was the first symptom. Only 16 (10 per cent) had the primary lesion established by biopsy prior to admission. The crux of the problem is the frequent failure to recognize the probably cancerous nature of cervical tumors in the adult and, furthermore, the failure to realize that practically all malignant cervical tumors in the neck are metastatic rather than primary. The most common erroneous diagnosis in cases of metastatic cervical cancer is to misinterpret the cervical mass as lymph node enlargement due to subacute or chronic infection. Asymmetric enlargement of one or more cervical nodes in the adult is almost always cancerous and usually is due to metastasis from a primary lesion in the mouth or pharynx.

If the primary lesion is not discovered after a thorough search extending over a period of at least two weeks, the treatment of the cervical tumor proved cancerous should be complete, involving either radiation therapy in the small single tumor or radical neck dissection for bulky or multiple node involvement. All patients in whom there is a possibility of a cryptic primary lesion of cancer should be given frequent (preferably monthly) systematic follow-up examinations for a period of at least five years.—*C. Dean Couch, Jr.*

■ Post-Operative Pain: Its Use in the Comparative Evaluation of Analgesics. E. M. Papper, Bernard B. Brodie and E. A. Rovenstine. Surgery 32:107, July, 1952.

The frequency and severity of postoperative pain have in general been overemphasized. In this study the criterion for the rating of postoperative pain was as simple as possible. Pain was considered absent if analgesic drugs were not required postoperatively, as moderate if a maximum of two doses of a potent analgesic drug (morphine or meperidine) was required within a 24 hour period and as severe if more than two doses of a potent narcotic was required in each 24 hour period.

By a variety of methods it was demonstrated that significant and real pain after surgical operation was present only in approximately a third of the patients subjected to operation. Furthermore, another third of the patients had no significant pain. A final third had pain which was moderate and easily relieved by infrequent doses of narcotics. These data suggest that extensive postoperative analgesic therapy is unnecessary as a routine measure.—*C. Dean Couch, Jr.*

■ PREVENTION AND TREATMENT OF BURN SHOCK. Raymond Shapiro. Plast. & Reconstruct. Surg. 8:272, October, 1951.

Shock can be anticipated if burns involve more than 20 per cent of the surface area of healthy adults and more than 15 per cent of the surface area of children or of aged persons.

A major factor in the causation of burn shock is the loss of plasma from the circulation into the tissues of the burned area with the ensuing hemoconcentration, decrease in total blood volume and fall in blood pressure. Because of the increased blood concentration and increased peripheral resistance in burn shock, blood pressure values may not fall until the total blood volume is considerably reduced. Therefore, blood pressure is a relatively poor index of the severity of plasma loss in burns.

There is evidence that sodium ions are of value in preventing shock in burn cases. These ions can be administered orally, as a first aid measure, in the form of hypotonic salt solutions. The salt solution is made by dissolving a teaspoonful of sodium chloride and a half teaspoonful of sodium bicarbonate or sodium citrate in a quart of water.

If shock is present or anticipated from the extent of the burn, intravenous therapy is started. Normal saline or 5 per cent glucose in normal saline is administered, and plasma may be given simultaneously or after 1,000 cc. of the electrolyte infusion has been given. Because the fluid that is lost from burned areas is similar in composition to blood plasma, it is logical to replace the bulk of this fluid loss with plasma. For each per cent over 10 of body surface burned, 100 cc. of plasma is given.

General anesthesia and manipulation and débridement of the burned area interfere with compensatory mechanisms and tend to increase the severity of shock. General anesthesia is contraindicated in the initial dressing of a burn; intensive cleansing and débridement of the injury do more harm than good. If it is necessary to administer morphine in order to allay pain, the intravenous route is preferable to subcutaneous or intramuscular injections.

Firm pressure dressings tend to splint the injured part, limit plasma exudation in burns of the extremities and allay pain. Thus, in a limited way, the pressure dressing may contribute to the management of shock.—*Herbert J. Bloom.*

■ FRACTURES OF THE JAWS AND FACIAL BONES. Fred Squier Dunn. Plast. & Reconstruct. Surg. 8:310, October, 1951.

If a great catastrophe strikes the civilian population, physicians and dentists working in the field will not be working under ideal conditions. They will be working largely alone and it will be a question of what they can do immediately for the greatest possible number. In most instances, this will consist of little more than making certain that the injured person's airway is open and that it can be maintained open, and administering penicillin and some pain-relieving drug.

The ideal anesthetic is procaine, principally because there will be no postoperative vomiting and the entire operation can be finished at one stage. If a general anesthetic is used, thiopental sodium should not be used unless an adequate airway by intratracheal intubation is established. The other forms of anesthesia are satisfactory provided one does not wire the upper jaw to the lower jaw for at least 24 hours postoperatively, until the danger of postoperative vomiting has passed.

All possible fragments should be retained, but the antibiotics must be aided by good surgical procedures and the establishment of drainage whenever indicated. The soft tissues should be closed and a minimum of débridement performed. Particularly, an opening of the antrum should be closed to avoid any antral involvement.

Among the various types of wiring, the best is one which will distribute the strain to the largest number of teeth and at the same time directly establish occlusion. Any procedure requiring the wiring of the jaws must be dependent on the patient's general condition, such as shock, fractures of the skull, injuries to the chest, abdomen or neck. Any tendency toward vomiting is a definite contraindication to wiring the jaws together.—*Herbert J. Bloom.*

■ Treatment of Thermal Burns Following an Atomic Bomb, Air Burst Explosion. William S. Stone. Plast. & Reconstruct. Surg. 8:269, October, 1951.

In discussing the problem of treatment of thermal burns following an atomic explosion, the first consideration is not the technical problem of treating the individual patient; rather all medical personnel must think first of the large number of burn cases that will occur and must devise ways and means whereby it will be possible for all cases to receive reasonable treatment.

It is estimated that in a modern large American city approximately 300,000 people will be exposed to the effects of an explosion and probably 50,000 of these individuals will suffer thermal burns. Analysis of the known physical data on this type of explosion shows that significant thermal radiation will occur for over two seconds and that for distances over one mile from the hypocenter the intensities of thermal radiation will be at a low enough level that if the individual is trained to take evasive action instantly following the flash of the explosion exposure to thermal radiation and blast effects can be greatly reduced. To make this type of evasive action possible, the populace has to be educated to its value and its time limitation and must be trained to react instantly to the light flash of the explosion.

The following is a tentative classification of burns and treatment, based on severity and per cent of body areas involved:

1. Mild: second degree burns over less than 15 per cent of body surface, no contained areas of third degree greater than 1 inch in diameter or greater than ½ inch involving the hands. Treatment: open method, self-help, with minor dressings, analgesics, and antibiotics.

2. Moderately severe: second degree burns over 15 to 20 per cent of body surface, contained areas of third degree not greater than 1 inch in diameter. Treatment: chiefly self-help as in 1, with some cases receiving one treatment in a dispensary. Dispensary care: chiefly open method of treatment, water and electrolyte by mouth, no intravenous therapy.

3. Severe: second degree burns affecting over 20 per cent of body surface, varying amounts of third degree burns or major third degree injuries involving the hands.—*Herbert J. Bloom.*

■ Facial Injuries. E. S. Murphy and others. Gen. Pract. 5:47, February, 1952.

About 10 per cent of all accidents involve the face and neck. As soon as the patient reaches a place where proper facilities are available for his care, he must be examined and treatment must be instituted immediately. A delay of even a few hours may change a contaminated wound capable of being cleansed and united by primary suture to an infected wound difficult to treat. If the circumstances of the accident or the nature of the wound suggest the possibility of contamination with organisms of gas gangrene or tetanus, specific prophylactic measures must be adopted at once.

With head injuries, primary consideration is naturally given to skull, brain, and nasal damage. Damage to these regions is of vital importance, readily recognized and repaired. Even if a deforming nasal fracture is overlooked, however, as long as the tissue is present, the deformity can be corrected at a later date. The injuries which are most likely to be overlooked are the deforming fractures of the maxilla. Delayed surgery in such instances is only partially satisfactory; it can improve but rarely can correct a maladjustment.

Diagnosis of the extent of injury is made by means of inspection, palpation and roentgenograms. Skin wounds are first anesthetized and then débrided before closure. When there are fractures of the superior maxilla, it may be necessary to support and stabilize the fragments after their elevation.

Fractures of the mandible should be stabilized before other fractures are corrected. When a patient is in a state of mental and physical prostration, if the mandible is stabilized so that he can eat and talk without much pain, his mental and physical condition improves at once. Adjustments in the fractured segments of the mandible can be made at any time by means of external fixation.—*J. K. Paul.*

Announcements

■ American Society of Oral Surgeons to Meet October 8-11 in New Orleans

The thirty-fourth annual meeting of the American Society of Oral Surgeons will be held October 8-11 at the Jung Hotel, New Orleans. W. T. Ewing of Akron, Ohio, president of the Society, will preside; D. C. McRimmon of Fort Worth will be installed as president for the coming year.

■ Dental Internship for 1953-54 Offered at Jewish Sanitarium and Hospital for Chronic Diseases

An approved internship which includes oral surgery, exodontics, dental anesthesiology and roentgenology, oral diagnosis and other phases of dentistry is being offered by the Jewish Sanitarium and Hospital for Chronic Diseases, Brooklyn. The internship will extend from July 1, 1953 to June 30, 1954. Applications are now being accepted.

Further information may be obtained from Joseph J. Obst, director of dentistry, Jewish Sanitarium and Hospital for Chronic Diseases, East 49th Street and Rutland Road, Brooklyn 3.

■ Navy Dental Corps Reserve Officers to Attend Annual Convention of Association of Military Surgeons

Reserve officers of the Navy Dental Corps will receive one retirement point credit for attendance at each of the three sessions of the annual convention of the Association of Military Surgeons, November 17-19 in Washington, D.C. Reserve officers in attendance are to report to a recording officer designated by the Chief of the Bureau of Medicine and Surgery.

■ New York Institute of Clinical Oral Pathology Meets in October

The New York Institute of Clinical Oral Pathology announces the first Herman L. Reiss Memorial Lecture to be held at the New York Academy of Medicine on Monday, October 27, 1952, at 8:30 P.M. The essayist will be Professor Robert V. Bradlaw, Sutherland Dental School, University of Durham, King's College, England, who will lecture on the subject of "Oral Syphilis."

■ Southeastern Society of Oral Surgeons to Meet

The Southeastern Society of Oral Surgeons will meet for its fourth annual meeting March 6-7, 1953, it has been announced by Irwin T. Hyatt of Atlanta, president.

Current officers of the Society are: Frank Jordan of Louisville, Ky., president-elect; George W. Matthews of Birmingham, vice-president; Charles Landis of Chattanooga, Tenn., secretary-treasurer, and Hill Gordon of Miami, Fla., editor.

■ Winter Meeting of American Academy of Dental Medicine to Feature Symposium on Pain

The American Academy of Dental Medicine will hold its annual midwinter meeting and luncheon December 7 at the Hotel Statler in New York City. The luncheon will begin at 12:30, after a business meeting for members which is scheduled to begin at 10 A.M.

Following the luncheon, a symposium on pain will be presented by R. J. Behan, Theodor Blum and Samuel C. Miller, with Joseph L. Bernier acting as moderator.

All members of the Academy and interested dentists and physicians are cordially invited. Reservations and program details may be obtained from the co-chairmen, Jack Englander, 2616 Hudson Boulevard, Jersey City, N. J., and Samuel Turkenkopf, 196 Montclair Avenue, Newark, N. J.

■ New York Institute Announces October May Courses

The New York Institute of Clinical Oral Pathology will conduct the following courses from October 1952 through May 1953:

Clinical Oral Pathology, 16 sessions, presented on two Wednesdays each month, 7:30-10 P.M.

Diagnostic and Surgical Technics, 8 sessions, given on one Wednesday a month, 7:30-10 P.M.

The courses are approved by the Veterans Administration and the education department of the University of the State of New York. Further information may be obtained by communicating with the Institute's executive secretary, 101 East 79th Street, New York 21.

■ American Board of Oral Surgery to Hold Examinations

Examinations for certification by the American Board of Oral Surgery will be held October 5, 6, 7 and 8 at the Jung Hotel, New Orleans.

Further information may be obtained by writing to the Board's secretary, Leslie M. FitzGerald, 718 Roshek Building, Dubuque, Iowa.

■ Tufts College Dental School Announces Courses in Minor Oral Surgery

Three courses in minor oral surgery will be presented at Tufts College Dental School during the academic year 1952-953 by Daniel J. Holland and staff. The dates of the courses are as follows: each Wednesday for eight weeks from October 1 to November 19, 1952; June 1 to 5, 1953, and an evening course each Wednesday, 7 to 10 P.M., for eight weeks from January 21 to March 25, 1953. The tuition for each course is $125. Further information may be obtained by writing to the Director of Postgraduate Studies, Tufts College Dental School, 136 Harrison Avenue, Boston.

■ American Society for the Advancement of General Anesthesia in Dentistry to Hear Evaluation of Thiamylal Sodium

The value of thiamylal sodium and new muscle relaxants in dental anesthesia will be discussed by Peere C. Lund of Johnstown, Pa., at the fall meeting of the American Society for the Advancement of General Anesthesia in Dentistry, October 27, in New York. Dr. Lund, a physician, is a diplo-

mate of the American Board of Anesthesiology and director of anesthesia at the Conemaugh Valley Memorial Hospital, Johnstown, Pa.

At the same meeting, M. Hillel Feldman, director of dental service at the Lincoln Hospital, New York, will discuss the use of inhalation anesthesia for the cardiac patient. Further information may be obtained by writing Dr. Feldman, who is secretary of the Society, at 730 Fifth Avenue, New York 19.

■ University of Minnesota Announces Graduate Program

Graduate study programs of 2-3 years, leading to the degree of master of science are now being arranged by the University of Minnesota. A program may be arranged with a major in oral surgery, oral pathology, orthodontics, oral medicine, periodontics or restorative dentistry (operative, prosthetics, pedodontics or endodontics) and a minor in one of the fundamental health sciences.

An alternate program in the basic sciences, with special reference to dentistry, leads to the doctor of philosophy degree.

A limited number of fellowships and teaching assistantships are available to the graduate students. Stipends for these appointments range up to $3,600 per year. Further information and application forms may be obtained from the dean of the Graduate School, University of Minnesota, Minneapolis.

Editorial communications

■ ORIGINAL COMMUNICATIONS—This journal invites concise original contributions in the broad field of clinical and experimental surgery of the mouth and associated structures, including roentgenology, diagnosis, anesthesia and oral surgical pathology. Articles are accepted for publication with the understanding that they are contributed solely to the JOURNAL OF ORAL SURGERY. All manuscripts are subject to editorial modification. Neither the editors nor the publishers accept responsibility for the views and statements of authors expressed in their communications.

■ MANUSCRIPTS—Manuscripts submitted for publication should be sent to Frederick A. Henny, Editor, Henry Ford Hospital, Detroit, Michigan.

Manuscripts should be typewritten on one side of the paper only with double spacing and liberal margins. The author's name and the abbreviated title of the article should appear at the top of each manuscript page. The original should be sent to the editor and a carbon copy retained by the author. Manuscripts will not be returned if accepted for publication.

References should be placed at the end of the article and should conform to the style of the Quarterly Cumulative Index Medicus; viz., name of author, title of article and name of periodical with volume, pages, month and year. They should be numbered and should appear in the same order as that of the superior figures inserted in the appropriate positions in the text.

■ ILLUSTRATIONS—Illustrations accompanying manuscripts should be unmounted and numbered. The author's name should appear on the margin or back.

Authors should insert figure numbers at appropriate places in the text. The original drawings, or glossy print photographs of them, should accompany the manuscript. Legends for illustrations are to be typewritten in a separate list with numbers corresponding to those on the photographs and drawings.

A reasonable number of halftone illustrations will be reproduced free of cost to the author, but special arrangements must be made with the editors for color plates, elaborate tables or extra illustrations. Copy for zinc cuts (such as pen drawings and charts) should be drawn and lettered in India ink or with black typewriter ribbon (carbon paper placed with carbon against back of sheet for bolder type). Ordinary blue or colors will not reproduce. Only good photographic prints or drawings should be supplied for halftone work.

■ CASE REPORTS—Case reports will constitute an important department of the journal and the editors welcome case reports that are of unusual clinical value or that present exceptional conditions of interest to dental surgeons.

■ EXCHANGES—Letters, exchanges, reprints and all other communications relating to the JOURNAL OF ORAL SURGERY should be sent to the American Dental Association, 222 East Superior Street, Chicago 11.

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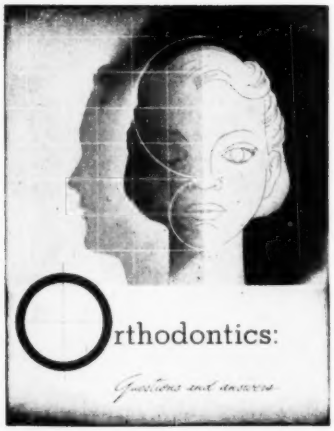

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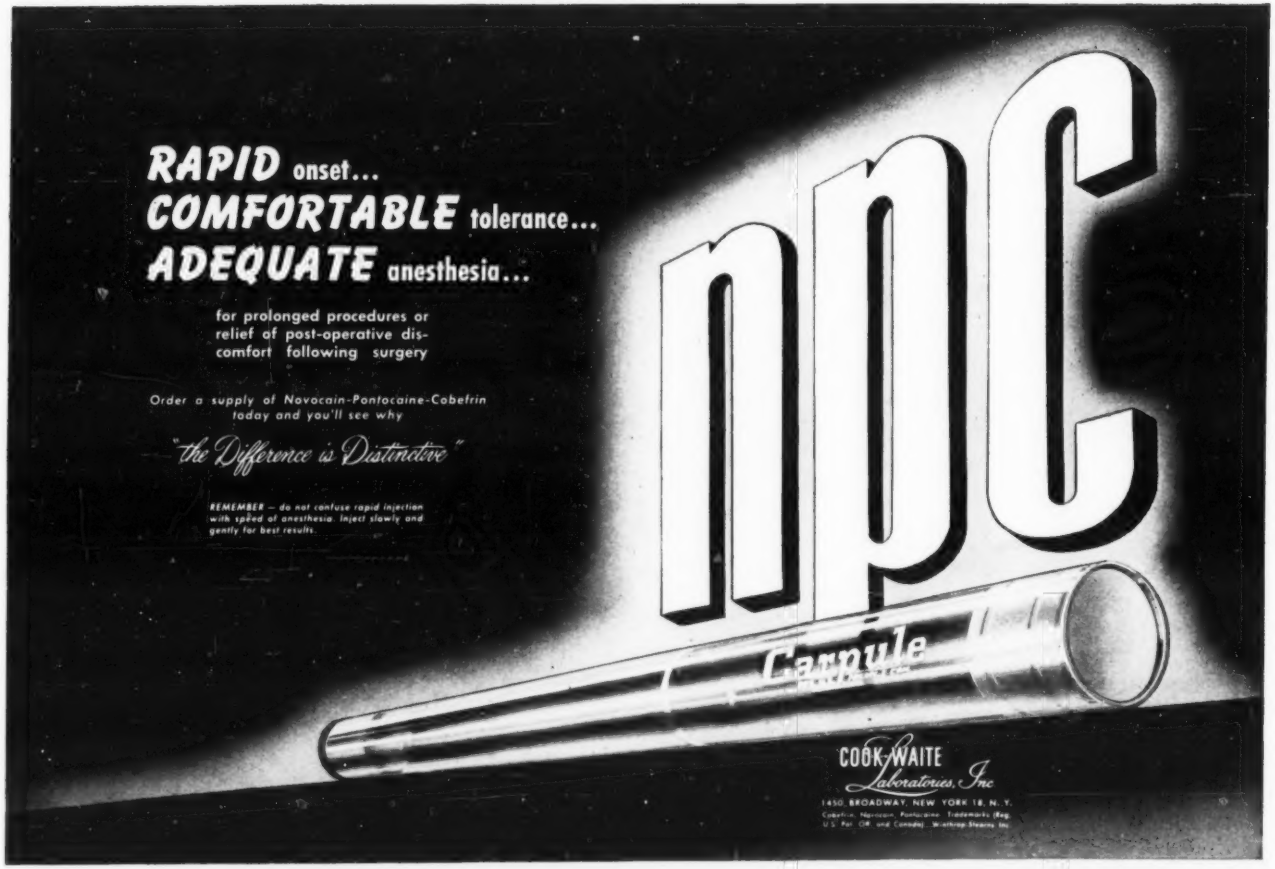
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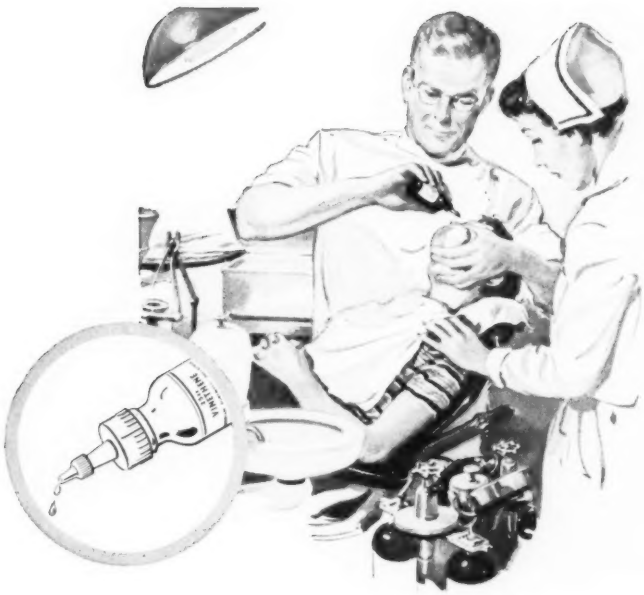

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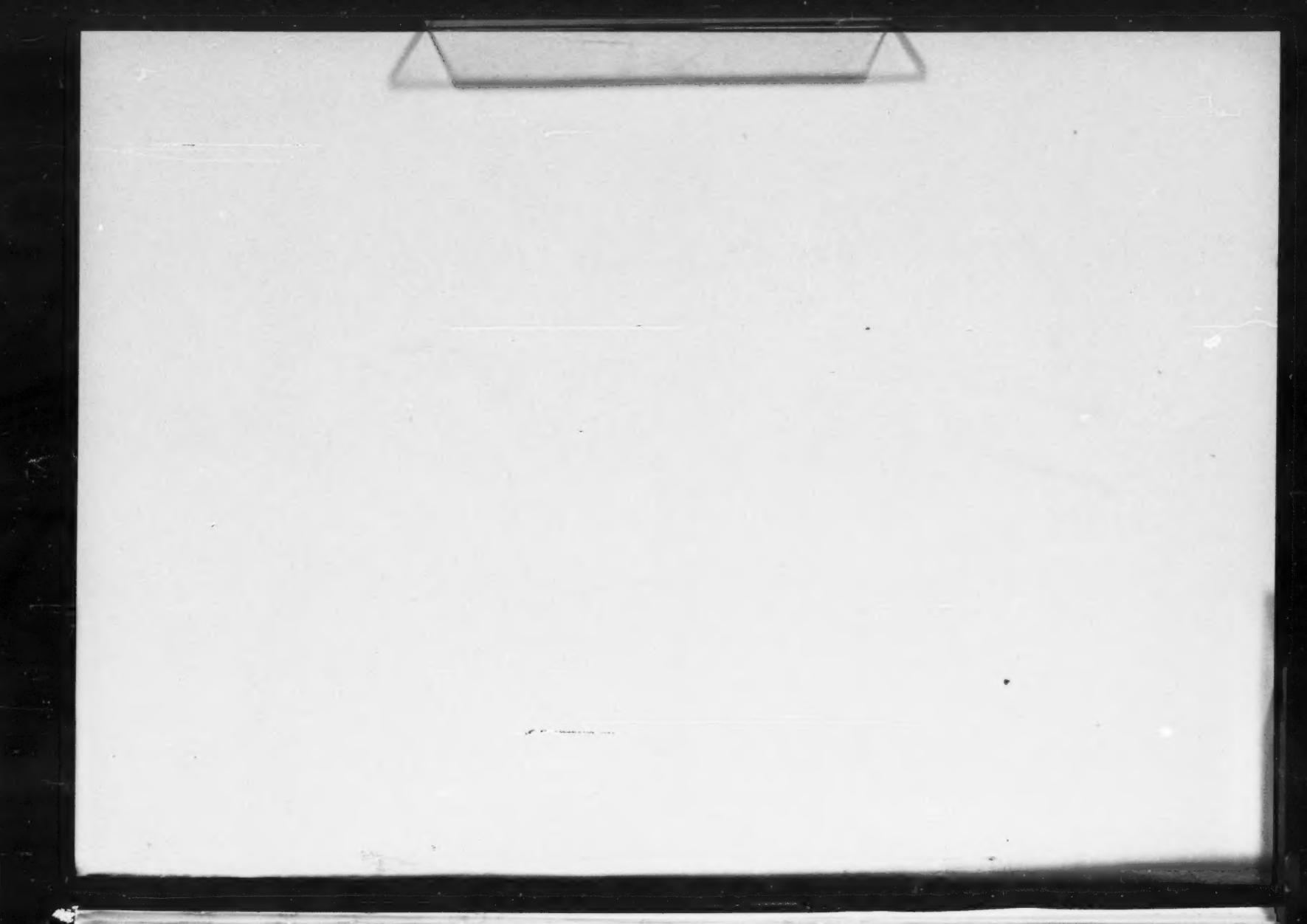

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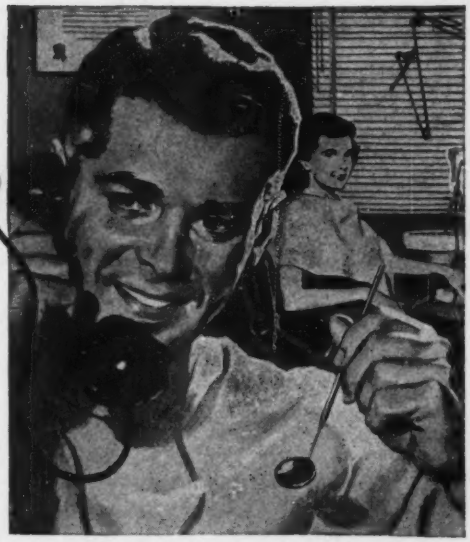

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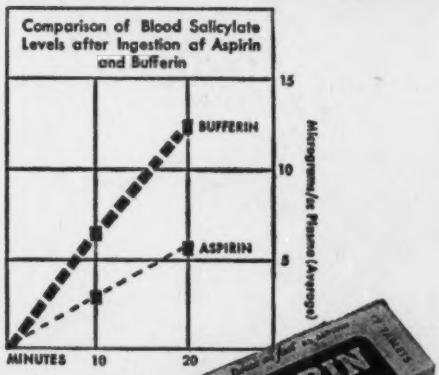

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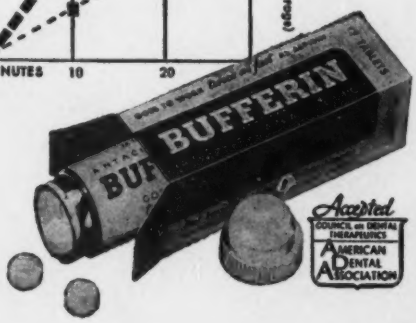

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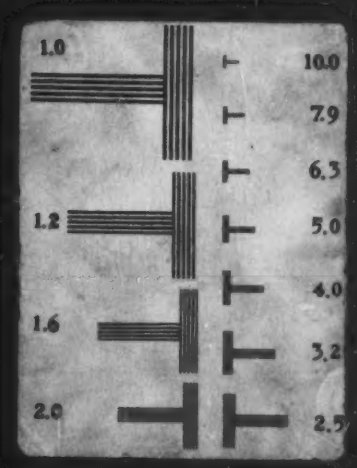

100 MILLIMETERS

INSTRUCTIONS Resolution is expressed in terms of the lines per millimeter recorded by a particular film under specified conditions. Numerals in chart indicate the number of lines per millimeter in adjacent "T-shaped" groupings.

In microfilming, it is necessary to determine the reduction ratio and multiply the number of lines in the chart by this value to find the number of lines recorded by the film. As an aid in determining the reduction ratio, the line above is 100 millimeters in length. Measuring this line in the film image and dividing the length into 100 gives the reduction ratio. Example: the line is 20 mm. long in the film image, and 100/20 = 5.

Examine "T-shaped" line groupings in the film with microscope, and note the number adjacent to the lines recorded sharply and distinctly. Multiply this number by the reduction factor to obtain resolving power in lines per millimeter. Example: 7.9 group of lines is clearly recorded while lines in the 10.0 group are not distinctly separated. Reduction ratio is 5, and 7.9 x 5 = 39.5 lines per millimeter recorded satisfactorily. 10.0 x 5 = 50 lines per millimeter which are not recorded satisfactorily. Under the particular conditions, maximum resolution is between 39.5 and 50 lines per millimeter.

Resolution, as measured on the film, is a test of the entire photographic system, including lens, exposure, processing, and other factors. These rarely utilize maximum resolution of the film. Vibrations during exposure, poor optical focus, and exposures yielding very dense negatives are to be avoided.

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